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NOTICE OF COLLEGE MEETING: The Stated Quarterly Meeting of the members of the Philadelphia College of Pharmacy and Science will be held in the College Building, 145 N. Tenth Street, Philadelphia, Pa., on Monday, December 29, 1924, at 2.30 P. M. At this meeting the changes proposed in the By-Laws of the College at the September Stated Meeting will be considered for final action.

No additional notice of this meeting will be sent out. Members are therefore requested to make note of the date.

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THE AMERICAN
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VOL. 96. DECEMBER, 1924. NO. 12.

EDITORIAL

TETRETHYL LEAD POISONING.

Widespread interest has been aroused by the occurrence of numerous cases of very severe poisoning by exposure to the fumes of the substance that has been recently introduced as an "anti-knock" for gasoline. The application of tetrethyl lead is the culmination of a long and ingenious research, and its application was gratefully received by the automobile-using public as a cure for an annoying feature of ordinary engine operation. The fulminant character of the poisonings and the peculiar symptoms have resulted in drastic measures on the part of public health authorities, and it is gratifying to note that these measures have been promptly supplemented by the gasoline companies, which have withdrawn the product from sale until further investigation will determine the limits of safety.

Tetrethyl lead belongs to a group designated collectively by the term "organo-metallic bodies," that now includes a great many compounds. The first produced was kakodyl oxide although this is more complex than the great majority of the members of the group, and is especially distinguished by containing oxygen. By far the greater number of known organo-metallic substances consist of a metal united to one or more molecules of a hydrocarbon radicle. Kakadylic oxide was first obtained in an impure form in 1760, by Cadet, a Paris apothecary, who distilled arsenous oxide with potassium acetate. The experiment was probably a random one. The distillate was long termed "Cadet's Fuming Liquor." Nothing definite was known about its composition until Bunsen made an extended study of it, and discovered that the principal ingredient is arsen-dimethyl oxide, and that arsen-dimethyl is capable of acting as an organic radicle, explicable under modern theories by the fact that

the methyl groups can satisfy only two bonds of the (triad) arsenic. Most of the derivatives of arsen-dimethyl are, as would be expected, very poisonous, but kakodylic acid is far less so than the arsenic content would suggest.

About the middle of the last century Frankland discovered zinc ethyl, Zn $(C_2H_5)_2$. Further researches led to the preparation of many other similar compounds. Among these were mercuric methyl and mercuric ethyl, analogous in composition to zinc ethyl. The mercuric compounds are very dense, highly refracting liquids. Mercuric ethyl, at the time of its first preparation was the heaviest liquid known, except liquid metals, having a specific gravity over 3. Unexpected, highly poisonous, properties were evidenced by these mercurial derivatives and two of the assistants working in Frankland's were fatally poisoned by the fumes. Tetrethyl lead has long been known, but like most of the organo-metallic bodies attracted but little attention. The compound of iron and carbon monoxide, Fe $(CO)_4$, discovered by Mond, deserves notice in this connection. It is a volatile liquid.

Among the common metals, mercury, lead and arsenic seem to be most dangerous to human beings, and probably to most of the lower animals. In common with the vast majority of substances, their compounds exhibit more or less power to produce acute poisoning, but great differences exist as to the dose required to produce death. It is, however, the development of slow poisoning by the ingestion of small amounts of their compounds that constitutes the most frequent and dangerous action. Mercury, lead and arsenic have a strong tendency to accumulate in the tissues of the body, so that even when only minute doses are taken, the poison will build up steadily until it becomes sufficient in amount to disturb seriously the function of the organ in which the accumulation has taken place. Generally, several important organs, such as the liver and brain, are involved. It seems from general experience that copper and zinc, although many of their compounds are in moderate dose capable of producing active poisonous effects, do not tend to accumulate to a dangerous extent. Copper is usually present in small amount in some of the digestive viscera and zinc also seems to be not infrequent.

We must, however, carefully distinguish between the action of these compounds as present in food, and their action in the form of

gases. In the former case they enter the system in association with many kinds of organic matter, especially proteins, and are either in rather insoluble combination or held as colloid-complexes so that free diffusion is prevented. All the venous blood from the digestive tract passes through the liver, which acts as a filter and the major portion of the metallic compounds is retained, for a time at least. Experience shows, however, that arsenic, lead and mercury are not entirely held back, and that the ingestion of repeated doses of their compounds will give rise to very serious symptoms.

The danger of metallic poisoning is vastly increased when the compound is volatile, and thus may pass directly into the arterial stream through the lungs. It is probable that the whole series of organo-metallic bodies will be found highly toxic, inasmuch as they are more or less volatile. In large proportion in air they will produce spasm of the glottis as with the common irritating gases, but in minute admixture, they will be likely to set up chronic conditions of a serious nature. Attention has recently been called to the dangers from the carbon monoxide of automobile exhausts, and should tetrethyl lead or any similar compound be largely used in gasoline, additional danger will be added. In view of the tendency to the construction of traffic subways in cities, there seems to be still greater peril impending, and it is to be hoped that inventive talent will be directed to finding some remedy for "knock" which will not involve the distribution of more poisonous gases than are now polluting the atmosphere from the operation of the automobile.

HENRY LEFFMANN.

SELECTED EDITORIAL

THE ALL-PHARMACY IDEA.

The one reason I have in mind for interesting myself in this topic, is that I am inclined to believe that there are two pharmaceutical interests now existing that seem to me to be, as time goes on, more and more divergent. I have reference to the interests and activities of the National Association of Retail Druggists, and the American Pharmaceutical Association. This is to be regretted.

I have no desire to fix the blame: perhaps no activities of either body are to be censured. Perhaps any detachment is a natural trend which might be characterized as evolutionary. This, however, I stress as unfortunate as it tends to hamper pharmaceutical progress. I am an old member of the A. Ph. A. and belong to the retired list, so to speak, and may make utterances from a more delicate standpoint, perhaps, than some of the younger members of the Association. I remember the days when the Association had not bifurcated, and also recall the incidents that lead to the detachment. Back of it was the fact that the enterprising members who supported the section of trade interests were dissatisfied with the slow-pokiness and lack of co-operation of their scientific confreres; and some of the Trade Interest individuals, chafing under imagined restraints of the scientific wing, organized the new body of militant workers and improvers of the more commercial aspect of pharmacy. It is well known that following the bifurcation this segment of the section of trade interests has developed into a very powerful organization of which its members should be justly proud. Since that time the special nature of the business side of pharmacy has been manifested not only in the N. A. R. D., but in developments like the Rexall and kindred special associations of druggists. The time was apparently ripe for the organization of a new body of drug trade workers. It was created and has flourished to its present state of permanent fruition.

It is not the purpose of this communication to discuss values of these organizations and the services they are rendering humanity, but the object is to emphasize what the writer feels to be very important, *viz.*, that the activities of this national body should be as far as possible co-operative and if so, its co-operative prominence should be present and apparent in the All-Pharmacy Headquarters Building. I see no difficulty in harmonizing the wholesale drug and wholesale manufacturers' interests to the extent of their willing alliance with the proposed enterprise. Indeed, I have great hope of these interests seeking a place which may be regarded as an integral part of the proposed headquarters. The more that we can bring pharmaceutical interests of all phases together—the greater progress in pharmacy we may hope for in the future.

One of the privileges of long service in affairs pharmaceutical is the acquiring of a perspective, and the ability by thoughtful ret-

rospection to abet constructiveness. Militancy no longer accompanies progressive action. Co-operation is craved. The proud desire for unassisted individual effort and success is gone. The welfare of the whole body, not that of the individual, is the wish. Many of us who were fearful of schisms as being possible wrecking influences, long ago cast such fears aside. There was work—important work to do, which was not covered under the workings of the parent pharmaceutical body; the bifurcating occurrence was exactly this—not a secession but a branching division. All have labored in the vineyard of pharmacy, in the cause of usefulness—most frequently in the niche they fitted best. Co-operative service has been rendered without being labeled.

The "All-Pharmacy" idea embraces all; invites all. Scientific pharmacy is the true base of pharmacy proper. Without it there would be no commercial pharmacy. Its prestige would be gone. It might number as greatly. There might be more in its business exercise, but in numbers there would not be strength. Let there be an endeavor to get together and keep together in upholding All-Pharmacy. Let us assist in the genesis of a Headquarters Building.

DEAN L. E. SAYRE.

LAWRENCE, KANSAS.

ORIGINAL ARTICLES

ARCTIC AND TROPICAL PENNSYLVANIA.*

By Henry Leffmann, A. M., M. D.

Lecturer on Research, Philadelphia College of Pharmacy and Science.

The written history of Pennsylvania, like that of the whole of North America, dates back only a few hundred years, beginning with the arrival of the first Europeans on our shores. We have, unfortunately, only vague records of the savage tribes that were in possession at the time of the discovery of the Continent. Prior to these savages, it seems likely that other savage races occupied the land,

*A lecture delivered October 9, 1924, being the first of the course of Popular Science Lectures for the session of 1924-1925, at the Philadelphia College of Pharmacy and Science.

and some authorities think that the American Indians (now often designated in American anthropologic literature as "Amerinds") are of Mongolian origin.

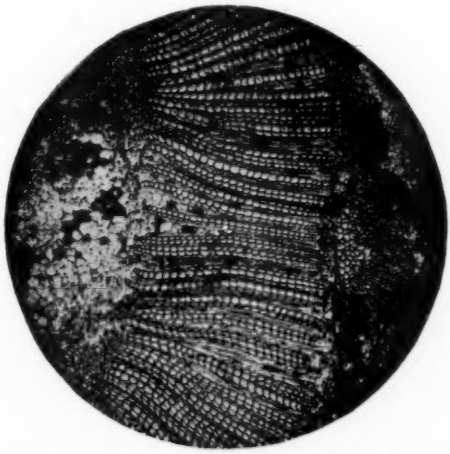
Whatever may have been the history of the human beings who first occupied the territory now included in Pennsylvania, we have in the testimony of the rocks a history of many thousands of years, during which the climate and the physiographic nature of the land underwent many changes, and while a vast amount of these changes has left no great impression, a few have, and it is to two characteristic conditions that attention is to be drawn.

The study of the history of the earth as evidenced in the rocks is known as "Geology." It is a science that has been pursued with vigor for less than two hundred years. For many centuries the teachers and investigators in the civilized world were satisfied that the account of creation given in the book of Genesis was the whole story. There were, of course, a few doubters for there has been no period in the history of the world when all men and women were of one opinion. Among the manifestations of difference in the earlier history of the earth was the fact that in many places the remains of animals and plants were found, such as shells, bones, and impressions of organized forms. These were generally regarded as the remains of animals and plants killed in the Flood.

About the time when our colonial forefathers were beginning to manifest actively their dissatisfaction with the actions of the Mother Country, certain men in Europe were beginning scientific inquiry into the rocks, their nature and the remains found in them. It became increasingly evident that the story of the development of the earth was a very long one, and the literal accuracy of the Genesis narrative was questioned. Very active discussion arose on this question, but it is not within the scope of this article to give the details. At the present day geologists are left to their own methods and opinions in discussing the problem of the age of the earth and the course of its development.

The tendency at the present day is to allow a very long time for the succession of geologic ages. Scientists do not hesitate to suggest billions of years. Much is guesswork, or at least reasoning based on premises that are of doubtful value. Almost all, however, who study the subject are impressed with the fact that the lapse of time has been very great, certainly many thousands of

years. In the determination of the order of succession of the formation of the different rock masses, the organized remains afford some guide, but even here, the data are unfortunately scanty and may be misleading. It appears, however, that as far as Pennsylvania and adjacent regions of North America are concerned, two well-marked contrasting periods have occurred. They were separated by a very long interval, but no trustworthy dates can be given. They have left their traces in unmistakable form upon the rocks and soils of region, and have profoundly modified the scenery of the area and also its economic relations.



Section of coal x 10, showing portion of stem of Lyginodendron oldhamium. Photomicrograph by H. Leffmann.

Tropical Pennsylvania.

The main characteristic of tropical regions is the abundance and luxuriant character of the animal and plant life. This is due to the fundamental climatic condition, warmth and moisture. Such a condition can be easily observed and studied in the tropical regions of the earth today. The tropical period in Pennsylvania is recorded especially in the coal deposits. It was evidently a period of long duration, and the vegetable remains are principally ferns and allied plants. These remains are, however, largely in the forms of impressions of the leaves upon the slaty materials associated with the coal. In many cases in which remains of organism, animal or vege-

table are preserved, the structure of organism is recognizable in very minute form, but in other cases merely the external covering or the impression is retained. In the case of the petrified trees in the remarkable petrified forests of Arizona, the minute structure can be easily detected by cutting thin sections of the mass, and examining these under the miscroscope. The tissues of the plant have been substituted by silica, more or less colored by foreign substances, such as iron compounds, so that the specimen resembles agate in hardness and appearance. Grinding is therefore required but this can now be done in very satisfactory manner, and when sections of these Arizona petrified trees are so examined under high power, the so-called "bordered pits," characteristic of pine wood are found, showing that these trees are of that type.

Similarly, in coal itself and in nodules occurring in the coal, remains of vegetable tissues can be clearly recognized. In most of these cases, the structure is that of ferns or their allies, but the specific forms are almost always of plants not now existing on the earth. In the earlier work in this line, sections were made by grinding, but a later method is the soaking of the mass in hydrofluoric acid for some time, by which much silicious matter is removed, and ultimately the specimen becomes so soft that it can be cut in thin films. By this means many interesting data have been obtained. It has been found, for instance, that pollen and spores entered largely into the formation of coal.

The transformation of plant structures into coal is a slow process, accomplished principally by the immersion of the plants in water or so covered from the air as to permit of a peculiar oxidation, by which the hydrogen, with the oxygen, is removed by degrees, so that the mass becomes proportionately richer in carbon. The early stages of such a change are seen in peat; later stages in lignite and brown coal. A further advance is noted in the so-called soft coals which still contain considerable hydrogen and some oxygen. Of course, most of the mineral matter contained in the plant, remains in the coal. This constitutes the ash, and is very different in proportion in different samples.

If we examine the coal deposits of Pennsylvania we find several markedly different forms. In the eastern part of the state, the strata generally have been much disturbed, in many cases almost set in an upright position. This evidences great pressure

and heat, and the coal deposits have undergone distillation by which almost all the constituents capable of volatilizing have been removed, and the residue consists of little else than carbon with the mineral matter originally in the plant tissue. This material constitutes "anthracite," which is such a valuable fuel. The anthracite deposits of Pennsylvania are practically unique. Some approach to them exists in other places, but nothing so directly applicable as a smokeless fuel. Passing westward it is noted that the rocks become less disturbed and distorted, and coal deposits are found containing notable amounts of hydrogen, constituting the semi-bituminous or steam coals, fuels of excellent quality for some in-

SECTION OF STEM OF ASTEROMYELON.

Section of coal x 10, showing portion of stem of Asteromyelon. Photomicrograph by H. Leffmann.

dustrial purposes, especially locomotive firing, as the mass takes fire quickly, and burns with comparatively little smoke. Still further west the strata have been scarcely at all disturbed, and the coal beds lie horizontal or nearly so. These deposits have suffered little change, and contain a considerable amount of hydrogen, so that they yield a large volume of gas burning with bright flame, and are known as gas-coals. They are the coals that were used originally in the making of illuminating gas. Gas-making establishments were extensively developed during the first half of the nineteenth century, using this coal, and producing valuable by-products, tar, ammonia-liquor, and coke. A process of making gas by directing

steam on hot coke or anthracite was developed, and the cost being much less, the old-fashioned coal-gas went out of favor and the newer product known as water-gas was largely introduced. As first produced this gas burns with an almost non-luminous flame. It is very suitable for heating but not for lighting; to fit it for the latter purposes it must be enriched, which is done by introducing oils.

The exact manner in which coals are formed has been of late, a matter of dispute, but it seems likely that in many cases, the successive vegetations dropped into the boggy soil in which they grew, and being covered by water and mud, underwent the slow and peculiar oxidations that have given rise to the coal. All stages of these changes from peat, which is the beginning, to hard coal, which is the final, can be observed when the deposits of different regions are compared. The coal deposits of Pennsylvania are among the most valuable in the world.

Seemingly abundant as are the remains from the coal and associated rocks, it is unfortunately evident that but a small portion of the life, animal and vegetable, is preserved. The department of science which deals with the fossil and other remains of living organisms is known as paleontology, a word made up from Greek terms and meaning "old being." It has two main branches, paleobotany and paleozoology, but the latter term is little used, those who study animal remains being usually designated as paleontologists. While modern science recognizes clearly that all living organisms may be included in "biology," naturalists, both those concerning with extinct species and those who study existing forms, mostly specialize either in botany or zoology. More or less overconfidence in the interpretation of remains is exhibited by paleontologists of both types and it would be well if all students of these subjects would read and remember Charles Darwin's chapter on the imperfection of the geological record, in his "Origin of Species."

The animal life of the coal period may have been rather characteristically reptilian. The great liability of insect forms to total destruction under the ordinary conditions of climate and soil, would lead to a loss of many species. Some insect remains are preserved, and it is worth noting that in the Belgian coal-fields, remains of dragon flies with a wing expansion of about twenty-nine inches

have been found. The recently devised methods of sectioning coal samples, mentioned above, have yielded interesting results, and have given rise to a new opinion in regard to the formation of coal beds, namely that in many cases these have not been formed by the simple accumulation of vegetable remains at the place where the coal is found, but most of the material has drifted or been swept in from other localities. It has been shown that pollen and the spores of cryptogamous plants have contributed to coal formation in larger proportion than was formerly supposed.

If the earth had undergone no violent changes since the coal

BOULDER ON CREST OF PENOBSCOT MOUNTAIN, LUZERNE CO., PA.
From Vol. Z, Second Geological Survey Pennsylvania.

period, we would, of course, have a much more vivid picture of the conditions, but several successive great disturbances have obliterated so much of the original physiography and destroyed so many of the remains, that our knowledge is a mere outline. Some geologists believe that by far the greater portion of the anthracite deposits in Pennsylvania have been swept off by denudation, and may be now at the bottom of the Atlantic Ocean.

One of the geologic questions, allied to the problem of coal formation is the origin of petroleum and natural gas. Several

theories have been advanced to account for these deposits. One suggestion is that the materials have been largely derived from vegetable organisms of comparatively simple type, which grow abundantly in moist places. Another opinion is that marine remains, especially fish, have been the source. Dr. J. M. Macfarlane, Emeritus Professor of Botany in the University of Pennsylvania, has lately published a book strongly advocating the latter view, but the subject cannot be further discussed here. Certainly, the gas and oil accumulations in different parts of the world constitute a most important source of fuel. The problem of securing control of such fields has entered into international relations and has become a seriously disturbing topic. We used to speak of pouring oil on troubled waters to still them, but oil of late has been continually troubling the waters of diplomacy.

When Charles II granted to William Penn, the territory that is now included in Pennsylvania, he imposed, as usual with royal gifts, certain tributes. Frequently these involved both nominal and real payments. The nominal payments were simply to maintain the principle that the monarch was the owner and had merely rented the territory or the privilege, and under his right of eminent domain could recall it, but the real payments were to inure to the benefit of his expense account. Charles obligated Penn and his successors to deliver yearly "at our Manor at Windsor" three beaver skins, and one-fifth of the "gold and silver oare found in the Province." The beaver skins were easily obtained, but the region never yielded any appreciable amount of precious metals, although small amounts of both have been found. The coal, iron, oil and gas of the State have, however, been among the most valuable products of any part of the world and have been the foundation of the largest fortunes the world has ever seen.

Arctic Pennsylvania.

At a comparatively late period in the geologic history of the State, though probably long before the advent of beings who can be classified as human, the region suffered a change to an arctic climate. There may have been, indeed, several successive periods of this climate with intervening temperate conditions. During the cold period an ice-sheet nearly half-a-mile thick covered a considerable portion of the northern portion of the State, and of course,

the larger part of the region to the northward and also extended westward. A period of such nature is known to geologists as a "glacial period."

Glaciers are ice-masses, formed from the accumulation of snow on mountain summits. If the summit is so low that all or most of the deposit made in the winter, is melted in the summer, a glacier will not be formed, but if the summit is above the line of perpetual snow, the successive falls will pile up on the mountain, and finally reach such a bulk that the under portions of the mass will be

INSIDE VIEW OF TERMINAL MORAINE, BANGOR, PA.
From Vol. Z, Second Geological Survey Pennsylvania.

compressed to ice, and in time the pressure will become great enough to cause the ice to move downward, filling the rifts and gorges on the mountain sides, and gradually reaching a point at which the onward movement (which is very slow) will be equal to the melting effect, and the ice will cease to advance, but will be converted into a river source. In this downward movement the ice will gather up many fragments, large and small, of rocks, and carry them onward. Where such rocks protrude from the mass so as rub against

the sides of the rifts or valleys in which the ice is moving, scratches will be produced, or even deep grooves. Sometimes the ice-mass passing over a tolerably high point will leave a boulder standing as evidence of its passing. The deposit of rock and dirt left at the point where the glacier melts is known as the "terminal moraine." In Pennsylvania, of course, all ice has long since disappeared, but the effects can be distinctly traced. A number of years ago, Henry C. Lewis, a Philadelphia geologist, explored the terminal moraine in the State, under the direction of the Commission for the Second Geological Survey, and his report published in Volume Z of the report of that survey, is liberally illustrated with photographs and maps showing the line of the moraine and many other data.

The line of the terminal moraine which marks the limit of the ice, enters the State about Belvidere, and turns to the northwestward. A little to the west of the center of the State it passes into New York State, but soon bends southward and runs down at such an angle that it makes its exit at the western border of Pennsylvania, at about the same latitude that it entered. The course of the terminal moraine is marked by deposits of earth and rock (till) often forming marked hills, and by deposits of boulders and by scratches and grooves on rocks. A great glacial groove is found on Table Rock at the Delaware Water Gap. Glacial scratches are found on the southern slope of Godfrey's Ridge, Monroe County. A boulder of conglomerate, nine feet in one dimension is found on the crest of Penobscot Knob in Luzerne County, at a point about 2000 feet above sea level. Penobscot Knob is only nine miles north of the terminal moraine, and its glaciation proves the great thickness of the ice near its edge.

Lewis' views of the character and extent of the ice-sheet are given in his report, noted above. That it must have been stratified is evident from meteorologic conditions. Every snowstorm added a new stratum to the top. Its whole thickness must have represented the separate snow precipitations of centuries. The top strata were loose, the middle strata more consolidated, the lower necessarily still further compacted, being in fact, converted into ice. A similar change in stratification is noted in the vertical edge of the great Antarctic glacier.

Continental snowstorms might cover the whole field with a new layer, but local or regional storms would increase the ice

sheet's thickness only where the fall occurred. The stratification of the whole sheet would be, therefore, irregular, but not so irregular as in Alpine countries, where as has been observed, snowstorms are localized and complicated with avalanches of masses of the different degrees of compression noted above. Such complications may have occurred in New Hampshire and Northern New York, prboably not elsewhere.

On the other hand, we must look at the equatorial wind as the chief source of snowfall, inasmuch as at present we see the greatest rainfall and snowfall take place along the geographical belt where the equatorial wind meets, rides over and is chilled by the south-driving Polar wind, clinging to the surface of the ground, and the warm air drops the moisture through this cold wind. This would teach us that the ice-sheet must have continually grown thicker along that same geographical belt, namely, New England, the northern states and the lake region; in other words in that part of the sheet that lay for some hundred miles back of the terminal moraine.

The numerous storms of the Alps do not cover up, except in winter, the lower stretches of the longer glaciers, because the snow melts in summer, falls through the crevasses and issues below as a stream. The same condition prevailed in the American ice-sheet, ali across the continent. The edge was an ice-cliff not a snow bank.

NOTES ON THE IRON-GREENING FACTOR OF DIGITALIS.*

By Josiah C. and Bertha L. DeG. Peacock.

The United States Pharmacopœia restricts the use of the name digitalis to the dried leaves of Digitalis purpurea, which is the material referred to in these notes.

The physiological effect of digitalis is both known and understood. But no such fortunate circumstance exists for its constituents. Instead, the very opposite state of affairs prevails, and, with scarcely any other drug of equally recognized value, is there so much confusion.

*Read before the 1924 Meeting of the Pennsylvania Pharmaceutical Association.

For a century, digitalis has been the subject of numerous investigations. The reports of the earlier workers pertain chiefly to the active principles, which are commonly designated as glucosides, but are made confusing by an indiscriminate use of names.

The reason for variation in the several proposed educts has long been known; Maisch summed it up in the words, "The behavior to solvents is more or less altered by the presence of other principles."

For a time, the hopelessness of separating the active substances cast some doubt on the future usefulness of the drug, but the advent of physiological assay methods has not only saved digitalis from threatening discard but actually given it a definite value; and the United States Pharmacopœia now requires the drug and its preparations to be standardized by means of such methods.

It was natural that attention should first be given to the active ingredients; but, though much effort has been expended on the separation of these principles, comparatively little regard has been paid to the nature of the inactive constituents. Therefore, while the works of reference abound in descriptions of the active principles, but casual consideration has been given to others.

Some later workers have devoted their efforts to the production of preparations of digitalis which, while representing the activity of the drug, should contain a minimum of inactive matter. Such products are especially desirable for hypodermic use.

It is evident that the improvement of this class of preparations depends largely upon a knowledge of the inactive constituents.

The slight importance accorded these principles is shown by the mere listing of their names; for instance, one author after much explanation of active constituents says "other usual constituents of plants, as tannic acid, volatile oil, coloring matter, starch, sugar, gum, salts."

Allen states "the other constituents of digitalis are not characteristic. They include chlorophyl, mucilage, albuminous matter, various salts and inosite."

Besides these inactive substances, other authors mention "extractive, resin, pectin, volatile oil, fixed oil, vegetable acids (both fixed and volatile), lignin and mineral matter." Two coloring principles, besides the chlorophyl so evidently present, are described as "red" and "yellow"; the former as analogous to extractive, the lat-

ter as "resembling chrysophan, a glucoside found in rhubarb." An "oxydase ferment" ascribed to the recently dried leaves completes the list of plant principles for digitalis.

It will be noted that the presence of vegetable acids has been commonly stated, and they have been repeatedly separated as crystalline substances, although vaguely described and named.

In 1834, W. J. Wilding (AMER. JOUR. PHARM.), concluded from experiments upon the leaves that they contain gallic acid, mucilage and reddish-brown coloring matter, soluble in water, insoluble in alcohol or ether. He found that "digitalis imparts its peculiar properties to cold or hot alcohol, and to boiling water; the decoction or infusion reddens litmus paper, and is precipitated by salts of iron, of a black color, etc." "The nitric, hydrochloric and sulphuric acids also produce precipitates." "Alcohol added to the decoction renders it of almost jelly-like consistence, probably owing to the mucilage it contains."

These remarks of Wilding appear to be the first recorded mention of the behavior of the constituents of digitalis toward iron compounds.

But Wilding only inferred the presence of gallic acid from this reaction, he did not isolate it.

That this behavior toward ferric salts was or was not due to a tannin seems to have had little import until Githens published his "Studies on The Pharmacology of Digitalis Bodies" in the *Journal of The American Pharmaceutical Association* for November, 1920. He there stated that his efforts were purposely and primarily concerning the active constituents; his interest in other constituents was only that involved in separating the active from the inactive matter.

In treating of these inactive components, he said that "in addition to the active glucosides, the leaf contains a very large amount of tannin, constituting, in water and dilute alcohol extracts, the largest part of the solids, and amounting to as much as 16 to 20 per cent. of the weight of the dried leaf." "The tannin is of great importance in helping to cause the bad taste and nauseating properties of the crude drug." "Besides the tannin, the only other inactive component of great importance is the saponin fraction."

To give an insight into the physical and chemical properties of the substance with which he dealt, we quote further from his article, "The marc left after extracting the leaf with chloroform was treated

with many different menstrua, chiefly various dilutions of alcohol, in an attempt to determine which extractive was best suited to remove the residual activity." "It was found that the amount of active matter was identical in extracts made with any percentage of alcohol from water to 75 per cent., but that if stronger alcohol were used, extraction was apt to be incomplete." "The total amount of solids removed was fairly constant with all dilutions until concentrations above 75 per cent. were reached. Thus from the same lot of leaf, 5 per cent. alcohol removed 425 grammes of solids per kilo; 75 per cent. removed 430 grammes, while 95 per cent. removed only 125 grammes. The difference in the amount of solids is mainly due to the tannins, which are not soluble in strong alcohol, and can be precipitated from extracts containing them, by merely increasing the percentage of alcohol."

It was this last statement, together with the one on the amount of tannin, which aroused special interest. The matter was discussed with Dr. Githens, who said that his estimation was based on the amount of a precipitate thrown out of water solution upon addition of several volumes of 95 per cent. alcohol, and that this precipitate, when redissolved in water, showed a green color with ferric chloride. Thus attributing this reaction to tannin, he used the term merely to tell of this material in contrast with the active ingredients with which alone he was concerned, and without intention to definitely designate the precipitated matter as tannin. Therefore, to the term as used by him, he attached no other significance than that of the iron-greening behavior of this constituent.

Dr. Githens welcomed further consideration of the subject and expressed the hope that effort would be made to isolate and purify the iron-greening factor. Accordingly this was undertaken.

In contemplating the likely occurrence of tannin in digitalis, certain facts of practical value are particularly worthy of review. For instance, while every plant material which contains tannin has not been listed as a source of this agent, still there are few drugs as well known as digitalis that have not been thus indexed if they show even a few per cent. of astringent principle, so little as 5 per cent. attracting attention. But, though the reaction of infusion of digitalis with iron salts has long been known, the drug is not found in such lists of plant substances; which is not at all strange because neither the taste of the leaf when chewed nor that of its infusion suggests astringency. The United States Pharmacopœia,

without further comment, describes the taste of digitalis as strongly bitter. Nor is there any qualification of this property by other authorities, except that some refer to the bitterness as nauseating. However, there is, at times, experienced from tasting strong decoctions a sensation of benumbedness, which might be fancied as astringency almost completely masked by bitterness.

Also, it may well be recalled that solubility in alcohol has been noted as a constant character of the tannins, even of those insoluble in water; for which reason, the tannins are not regarded as precipitable from water soutions by addition of alcohol in any amount.

But since some very unexpected results have been realized while working with tannins, surprises may well be expected; and, during the last few years, experience has shown that not even taste can be depended upon as a guide, for the tannins of red rose petals and wild cherry bark are examples of these principles which are bitter as well as astringent. Experience has clearly revealed the need to isolate and purify every such plant principle as the way to an understanding of its behavior in galenicals.

A number of preliminary experiments were made, during which the presence of an iron-greening constituent was abundantly demonstrated.

Extractions of the leaf with both hot and cold water and with different dilutions of alcohol substantiated the statement of Githens with reference to the extent of solvent action of varying percentages of alcohol, but did not show the iron-greening factor to be insoluble in official alcohol. The precipitating effect of strong alcohol on aqueous and weak alcoholic extractions was also confirmed, but it was found upon washing the precipitate with alcohol, dissolving in water and reprecipitating with alcohol, that the precipitated matter gradually lost its iron-greening effect. Whitish or rusty-looking gelatinous precipitates are produced by acetone just as by alcohol.

Estimations of the "tanning value" of digitalis were made by use of the "hide-powder" method. The hot water infusion of one lot of drug showed 23.33 per cent. and that of another lot 26.66 per cent. A cold water infusion of the latter lot gave figures to indicate 30 per cent. The solids removed by hide represented from about two-thirds to three-quarters of the total soluble solids.

The effect of the rasped raw hide on these infusions was remarkable. Originally dark colored, with heavy odor, strongly acid

to litmus, very bitter and giving much dark-green color with ferric chloride, contact with hide powder for a few hours, followed by straining and filtration, showed that all but traces of color, odor, acidity, bitterness and iron-greening effect had been absorbed. When the liquid was again treated with hide powder and again expressed from it and filtered, it was found to have lost all color reaction to ferric chloride. This behavior distinctly proves the absence of gallic acid; conditions to detect which were here proven as proper by control of test.

So far as removal of acidity by hide is concerned, comparisons by actual titration indicated that as much as 95 per cent. of the original acidity had been withdrawn from the liquid. In some instances the hide-treated solutions gave precipitates with lead acetate, with others this did not occur or was but slight. Under the influence of hide, the behaviors of hot and cold water infusions were little, if any, different. By fractional application of the hide, it was found that the absorption of the several properties is gradual. Infusions of digitalis may or may not precipitate gelatin solution; the addition of acetic acid, which has been found to facilitate such precipitation with some tannin materials, was not uniformly dependable with these infusions.

The large amount of solids absorbed by the hide led to the adoption of half-kilo. quantities of the drug for extraction with the several solvents which were decided upon for trial in methods that have been successfully employed for isolating and purifying tannins.

One such portion was exhausted with cold water, a second with boiling water, a third with chloroform and then with acetone, a fourth with acetone only, and a fifth with acetic ether. Chloroform removed about 3.88 per cent. of dark-green, fatty or oily extractive. Acetone, applied thereafter, took out about the same amount of solids. While this extractive contained chlorophyl, it was of a very different texture from that of the chloroform extractive. The acetone extractive yielded little to ether, but was completely soluble in acetic ether, and largely soluble in water.

Every one of the foregoing-named solvents removed from digitalis the cause of the iron-greening reaction. But upon following out the usual plan of treating the extracted matter with water, shaking out with acetic ether, and purifying the substance so removed by trituration with ether and chloroform, only a trifling

amount of the half-kilo. of material started with was found to have followed through. During these experiments it was learned that neither acetic ether, ether nor chloroform completely washed out the iron-greening factor from water solution. All of these solvents removed some of the substance, acetic ether extracting it more readily than ether, chloroform less readily. Consequently all phases of the drug material gave the characteristic reaction with ferric chloride. In the substance removed there was much of a white crystalline acid principle that tenaciously accompanied the slight amount of matter which followed through the above-outlined process. The final product from half-kilo. portions of the drug had a light-straw color, but was little more than a few blotches on the glass of the flask in which it was recovered from solution in acetic ether or alcohol.

The relatively larger amount of solids absorbed by hide made this result all the more peculiar.

The several half-kilo. portions having failed to give an appreciable yield, four kilo. of ground digitalis were percolated with acetone until exhausted. The extractive from this lot amounted to about 6.66 per cent. It apparently contained the greater part, if not all, of what chloroform removes from the drug.

This treatment with acetone took out much of the iron-greening factor, but not all of it. It had been found by preliminary experiments that acetone, like alcohol, has a precipitating effect upon certain of the constituents, therefore, as with alcohol, it is reasonable to infer that acetone, too, fails to completely extract that fraction of the iron-greening factor which is thereby enveloped and retained by the marc. This, indeed, is the explanation of the smaller amount of extractive by strong alcohol, but which extractive contains abundance of the iron-greening factor.

After the marc from the acetone extraction had been deprived of adhering solvent, a portion of it was treated with cold water. Six successively applied lots, each followed by expression, practically accomplished exhaustion of this material in so far as color, taste, acidity and iron-greening reaction served as guides. The several watery solutions showed these features in gradual diminution from the first with much color, odor, acidity, bitterness and iron reaction down to an almost complete absence of these properties. These liquids were mixed and evaporated to about twice the original drug volume, then mixed with six volumes of acetone, which pro-

duced a decided turbidity due to a precipitate which gradually settled into a reddish-amber, viscid, gum-like sediment. The liquid retained its original dark-amber color. Next, the marc was boiled with water, which treatment removed more soluble solids, but much less than those by cold water. .The hot water extractions were concentrated, and mixed with acetone as was the cold water treatment. It, too, yielded a viscid sediment similar to that from the cold water analogue, but less.

An examination of these viscid precipitates and of the liquids in which they were produced, showed that the iron-greening substance tended to remain in solution rather than to precipitate with acetone. It is therefore in the precipitate by inclusion and not because of insolubility.

These gum-like precipitates were insoluble in acetic ether and alcohol, but readily soluble in water, which solution yielded nothing of account to acetic ether. Neither the water solutions of these substances, nor the original water extractions from which they were obtained, showed any change in color with iodine test solution.

Returning to consideration of the acetone extractive, this substance was treated with chloroform, which took up the greater part of the chlorophyl and left a reddish-brown, plastic mass. This was freed of chloroform by warming and then treated with water in which it was almost entirely soluble. The solution had a dark-amber color, was very bitter, strongly acid to litmus and reacted abundantly green with ferric chloride. The water solution, clarified by aid of paper pulp, was shaken with acetic ether which removed a considerable amount of reddish-amber, semi-solid matter, as shown upon recovery of solvent. When this residue became cool, crystalline substance was plainly discernible in the mass. It was noted that the later portions of the acetic ether were removing proportionately more of the crystalline matter than of other substances. By recrystallizing the matter taken out by further application of acetic ether, using this same solvent for the process, pure white crystals of an acid principle were finally obtained. When the crystals of this acid are untinged with yellow, they do not give a green color with iron solution, but do precipitate lead acetate of a canary-yellow. When free from yellow color, these crystals are sour but not bitter.

The material taken out of the water solution by acetic ether, and left as a mixture of crystalline and non-crystalline matter, was

treated with several successive lots of ether, which gradually took away some of the crystalline matter as also a yellow substance which seemed to be amorphous. But the removal of these substances appeared to progress only to a certain point and there stop, after which resolution in water and again shaking out with acetic ether had the effect of again inducing ether to remove additional yellow color, but little of the crystalline matter. Chloroform was serviceable in the first few repetitions of this water treatment, by removing green and yellow coloring matter; thereafter it was without effect.

In the early stages of this treatment of the acetone extractive, some considerable amount of a somewhat porous residue, in appearance, very much resembling a tannin, was left upon evaporating, *in vacuo,* the acetic ether with which this substance had been taken from water solution. But the next application of water showed the greater part of this residue to be insoluble.

To guard against loss here of tannin insoluble in water, like that found in maté, the insoluble portion was at once taken into acetic ether solution, reobtained by distilling off the solvent, and subjected to repeated treatment with ether and chloroform. These solvents continued to remove small amounts of soluble matter, until the mass was again mostly soluble in water. To further protect against loss of tannin of this peculiar nature, all water-insoluble residues were checked up by similar treatment. These formations were mainly of fatty, waxy, chlorophyl and resinous substances. The care that was taken throughout the process warrants the belief that no substance of the usual tannin nature was anywhere lost or set aside. The chloroform-soluble part of the acetone extractive was worked through the process for tannin; it showed nothing of such nature beyond small amounts of the iron-greening factor.

Finally, by the process outlined, an almost colorless product, that appeared to be little if any changed by further use of solvents, was had. The tendency to form a porous residue upon evaporation of solvent had by this time much diminished, still there was such tendency left in the product, though when the liquid was approaching dryness and there was for a moment a froth-like formation at the edge of the liquid which spread into the area of the residue as evaporation went on, there was a change in appearance as the last few drops of solvent were vaporized, the mass coalescing into a pellucid-punctate, straw-colored film upon the flask.

Although this educt gives the characteristic reaction with ferric chloride, and has withstood all attempts to further purify it, still it is not regarded as a single substance. It contains crystalline substance, which at times has been unmistakably visible.

A second lot of four kilo. of digitalis was exhausted with acetone, and the solids thus removed treated at once with water, without the intervention of chloroform. The experience with this lot was but little different from that had from the previous method. The interferences and outcome were about the same.

With the thought of excluding some of the substances which prove to be insoluble in water, a third lot of four kilo. of the drug was exhausted with hot water; the decoctions were mixed, concentrated, cooled, strained and shaken with acetic ether. Separated and evaporated, this solvent left a reddish-amber semi-fluid residue, that, upon treatment with ether, chloroform, acetic ether and water, as customarily used for the purpose, gave an educt identical in appearance and other general properties to those from the acetone extractions.

Since similar results were had by operating on kilo. lots of the drug with cold water, it would seem that boiling the solution of the soluble solids does not influence the final product.

Dialysis was turned to as a possible means of isolation and purification. Some very concentrated decoction was placed in an animal parchment bag and this suspended in sufficient water to submerge the entire bulk of contents. It was soon demonstrated that the yellow color, the bitterness, the acidity and the iron-greening substance were passing through the membrane. The water was frequently changed. Eventually the osmosis was complete, all bitterness and all iron-greening reaction having passed through, and only the slightest herbaceous taste, without suggestion of astringency, was left in the liquid remaining within the septum. This experiment was made several times, with the same result. This was found to be the case with the isolated material as well as with the decoction.

Being flatly contradictory to the effect of hide-powder, this experience with the dialysis of solutions of the iron-greening factor becomes intensely interesting.

The educts from the several methods of isolation and purification gave the characteristic iron-greening reaction. They were all sparingly or slowly soluble in cold water, more readily in hot;

the solutions displayed amber colors, possessed very bitter tastes, had strong acid reactions to litmus. Their solutions were precipitated by lead acetate, and by gelatin. Hide-powder removed all of these attributes, except a slight taste and some greatly reduced precipitating effect with lead acetate. They were soluble in alcohol and acetone; insoluble in ether and chloroform. They were dialysable from pure water solution, just as from decoctions. The substances dissolved in alkalies (ammonium, potassium and calcium hydrates) with production of deep yellow colors. These solutions are rendered colorless by acidification; there is also precipitation during this change.

If this educt is regarded as a tannin it is a most unusual one. The chief point in evidence that this iron-greening principle might be a tannin is the fact that hide-powder completely absorbs it and that it precipitates gelatin—two properties, at present, authenticated to all tannins, but which, in the light of the equally patent fact that this iron-greening factor passes through animal membrane, need to be better understood before the presence of tannin in digitalis or its absence therefrom can be conclusively decided.

To summarize results, it may be said that:

The matter precipitated by alcohol is not responsible for the iron-greening behavior; it merely envelops some of the cause of this. The iron-greening factor is soluble in 95 per cent. alcohol.

Digitalis contains colorless, bitterless, crystalline acid substance which gives no change in color with ferric chloride.

Digitalis does not contain gallic acid, gallotannic acid or tannins like those found in oak bark, pecan nut, red rose, maté or wild cherry.

While the iron-greening factor is completely absorbed by hide-powder, it is equally capable of passing through animal membrane. Which contradictory behaviors at once raise that continually recurring enigmatic question: What is a tannin?

To avoid adding to the existing confusion, it is suggested that, until more is known of this anomalous constituent of digitalis, the same be referred to as the iron-greening factor.

PRACTICAL SUGGESTIONS FROM EXPERIENCE.*

By Joseph Jacobs, Ph. M., Sc. D.

As a business problem, pure and simple, the advisability of our druggists making a complete line of distinctive preparations is almost universally admitted, but I do not accept as the sole reason the purpose of replacing patent medicines; for in the present state of trade conditions, we cannot afford to oppose their sale. Indeed, I contend that when the law has conferred special patent rights and a manufacturer has spent time, labor, thought and money in fabricating and advertising a preparation, placing it successfully on the market, and a customer applies at your counter calling for this preparation, he is more the customer of the advertiser than yours, and you should not attempt to foist anything else upon him. The instance here stated differs widely from the situation presented by a customer who comes for advice, and demands your personal and professional aid in helping him out of a state of doubt and uncertainty. In the one case it is the paid advertisement of the proprietary owner that brought in your visitor; in the other, it was your own personal character and reputation. In the first-stated case, you should supply him with his stated want; in the other, it is your clear right, and often your duty, to recommend some preparation of your own. Thus, by fair dealing you increase your reputation for straightforward action, and your advice is stripped of the suspicion of selfishness.

My experience is that the buyer of patent medicines is generally strongly bent upon procuring them, comes in at your door with a well-settled mind, and that a strong argument is usually necessary to change the current of his thought toward your own preparation. "Even though vanquished," he will buy, but "argue still," in his own thoughts, and will be restless until he has gone to some other store and worked out his original theory.

But the desideratum is, how best can a profitable trade in articles of your own make be effected? This, of course, opens a wide field of discussion, but I note only one item. The many economies of judicious advertising may be conserved. For instance, there are cases where drug men have been argued into spending money adver-

*Read before the 1924 meeting of the Georgia Pharmaceutical Association.

tising "Nerve Debility Remedies" in their locality, paying perhaps as much direct to the maker and to the local printer as $8.00 per dozen for a preparation they could put up at about $10.00 per gross, and then allowing an article of unknown composition to go into their community under the prestige of their names. Instances have even been known where abortants thus duped our druggists. It is strange that these same men do not take the overplus saved by making some really legitimate and meritorious compound, and spend the advertising money spreading abroad the knowledge of the virtues of their own remedies. It is not necessary nor advisable in many cases to make large contracts for advertising with the newspapers. From experience I have learned that an appearance in your local paper daily with a small "ad" of from three to four inches, changing the matter every day, and keeping *your own preparations* before the public, is best. You will find that it will not be long before that public has become familiar with your preparations, and customers will not only call for them, but when your advice is asked you have an easy task to induce them to buy. Advertising like this has a cumulative effect, and, like some medicines, the more concentrated and oftener they are repeated, the more cumulative.

The next point I wish to stress is individuality of preparations. Do not simulate in name or appearance any well-known or largely advertised article. Exercise your brains and ingenuity in preparing for the market something unique and original. It is far better to have one original preparation than dozens more or less imitating the patents on the market.

It is the height of business inconsistency to allow some manufacturing pharmacist or non-secret house to prepare for you a line of preparations bearing your name, their composition and method of manufacture being as little known to the druggist as the average patent medicine. This practice works a fraud on your community, besides losing you money. It is a fraud on your customers, because you place your name on a remedy and its claims as an inducement to buy, when you do not and cannot know that the formula has been fully and correctly followed. It is carrying the agency principle too far for fair and upright business practice. When the coin comes from your own mint, you can know that it is of the standard weight and fineness.

Let me quote one of the stereotyped arguments used by the manufacturers of non-secret remedies, with their offices full of

name-blank labels: "Recognizing the fact that many pharmacists cannot, owing to lack of time, help, printing facilities, etc., manufacture all the specialties they sell, we have, at a large expense, equipped a plant for the manufacture of these goods. Although we are opposed to *cheap goods always,* we cannot impose upon the intelligence of the pharmacist by giving him the formula of our non-secret remedies (the cost of the ingredients of which he well knows) and at the same time expect his business, unless we can furnish prices which would make it unprofitable for him to make the same goods himself." Such literature and appeals have misled many druggists throughout the land into having their preparations made instead of manufacturing them under their own eye, and the number and extent of these non-secret manufacturing concerns seems to be growing every year. I was about to speak of making goods in the pharmacist's own laboratory, but remembering how few of our drug stores have a department that can be dignified by that name, I must not use the term in any general way.

Let me show the fallacy of these stereotyped arguments: No mammoth "plant" is necessary for success in home manufacture. Equipment on a reasonable scale, and help in comparatively small numbers of employees, are sufficient for a reasonably large number and quantity of specialties. The "time" can be had by rising a little earlier, and moving a little quicker, both conducive to longevity and athletic improvement; the "help" will come for reasonable pay and kind treatment, and "printing facilities" are about as abundant as "proprietary plants" and no "corner" on their products; and a like answer is possible for all the "so-forths." A salesman for one of these houses, in describing how many labels, cartons and bottles, varying in places of manufacture, prices and styles, is necessary to be on hand before attempting to manufacture, will talk you into a maze of kaleidoscopic bugbears, that will fade and disappear in the light of a little common-sense reflection.

After all, we have the example of many stores today having preparations of more or less extensive sale, put up by the druggist either in his own specially-designed bottle or in some well-known staple style, such as Philadelphia oval or Union oval. Either a plain stock carton is used, employing the same label on carton and bottle, or the label is merely placed on the bottle and the package wrapped in colored paper, making a neat article.

I wish to condemn the practice *in toto,* and think it should be

generally discontinued, that of placing foreign labels on our American goods. We must all, merchants in every line of trade, stop this appearance of fraud. At the hazard of wounding the political nerves of some of our members, I will say that I believe it is the result mainly of our tariff system of trade and federal taxation. Besides, it is an unpatriotic, mean, covert admission that Americans can be outdone by any nationality at anything, which I do not feel disposed to admit; for I believe that with our wonderful resources, our intelligence, science and skill, we can, if we try, write "Excelsior" upon anything the product of any effort we may design or make in every line of human endeavor.

Putting up bird seed, bird food, and like preparations, is easily done at a large saving. For a long time I was shortsighted enough to pay freight on bird sand and bird gravel, freighting all the way from the East at a cost of double their first price, as much as the whole cost of manufacture at home. These materials I discovered in the branch, while my boys were catching "horny-heads" or running after sweet shrubs and butterflies.

I have endeavored to submit some practical ideas, emphasizing the fact that money can be saved and made by manufacturing a line of original preparations, and that it does not require extensive apparatus nor large investment of capital in raw material.

Let us commence more and more to develop and cultivate our practical skill in the pursuit of our calling. Surely the trained and educated pharmacists of America can do as well and know the feats that are naturally expected from their art and science. We live in a wide-awake, progressive age. Let us keep abreast of all the other callings and professions in every worthy *line of achievement*.

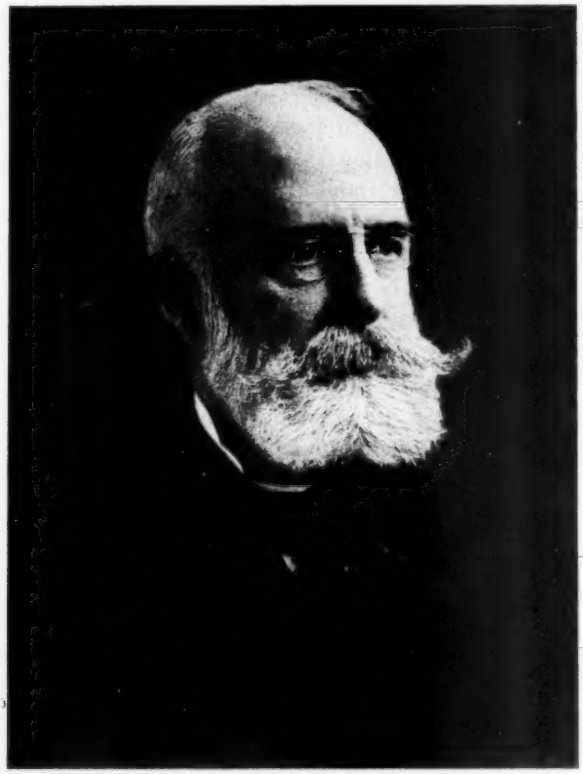
IN MEMORIAM.

HOWARD B. FRENCH

President of the Philadelphia College of Pharmacy, 1900-1921.

Howard Barclay French, eighth president of the Philadelphia College of Pharmacy and Science, died October 16, 1924, at his summer home, Alderbrook, Radnor, Pa., of heart trouble aggravated by a motor accident which occurred last May from the effects of which he never fully recovered.

Mr. French was born in Salem, Ohio, on September 23, 1848, the son of Samuel H. French and Angelina D. French. He was a descendant of Thomas French, who, with his wife, Jane Atkins French, and nine children, came over on the ship "Kent" from England in 1680 and settled, with other members of the Society of Friends, within a few miles of Burlington, N. J.



HOWARD B. FRENCH.

When he was a lad his parents moved to Philadelphia, and he was educated in the Friends' schools. He then served a three years' apprenticeship in the "drug and apothecary business" with William B. Webb, matriculated in the Philadelphia College of Pharmacy, from which he was graduated in 1870. The subject of his thesis was "Syrup of Guaiac."

He then entered the employ of his father's firm, French, Richards and Company, wholesale druggists and paint manufacturers. In 1883 the two departments of the business were divided, and Mr. French, and his brother William H., joined their father and John L. Longstreth in forming Samuel H. French & Company, which succeeded to the paint manufacturing business, while Smith, Kline & French Company succeeded to the wholesale drug business. Following the demise of his father and brother, and the retirement of Mr. Longstreth in 1901, Mr. French became the sole proprietor of the business. When the present corporation succeeded to the ownership in 1921 he became its president.

For practically half a century Mr. French took the deepest interest in the Philadelphia College of Pharmacy. He was elected to the board of trustees in 1872, became second vice-president in 1897, and president in 1900. He continued as president until 1921. During these years of service he exhibited a steadfastness and loyalty of devotion to the institution that has been rarely equalled.

As chairman of the Committee on Building for the erection of the new buildings of the College on Tenth Street and the equipment of the enlarged building in 1892-93, he was exceedingly active. In token of appreciation of his zeal and devotion he was presented, at the formal opening of the building on February 22, 1893, with a beautiful silver loving cup, the statement being made that the College building was "the largest building in the world devoted solely to pharmaceutical and chemical teaching and was well built and admirably adapted for the purpose."

Mr. French was especially interested in the museum and library of the College. In 1894, with Smith, Kline & French Company, he presented to the College the Martindale Herbarium, a noted and valuable collection of many thousands of plants, and later (1916) secured for the College the gift of 15,000 botanical specimens from the Commercial Museum of Philadelphia. In 1895 he presented to the College likenesses of the presidents of the British Pharmaceutical Society from the formation of the Society in 1841 to date, and the following year more than 2000 volumes from the library of the late Dr. W. S. W. Ruschenberger, and later (1901) many volumes from the library of the late Professor John M. Maisch. It was through his influence that the Edward T. Dobbins Library Fund of $20,000 was established by Miss Mary A. Dobbins in 1921, in memory of her brother, Edward Tonkin Dobbins, a graduate of the

class of 1862, for purpose of supporting and enlarging the College Library, a gift that has been of great value in developing this important collection of books, probably the most important of its kind in the country.

He regarded scholarship as of the end-product of education and strove to inspire in the student body of the College a desire for higher scholarship by establishing, in 1901, in commemoration of the eightieth year of the existence of the College, the Howard B. French Cup, to be held by the class of 1901 until a higher class average had been made by a succeeding class, and so on, perpetually, from class to class. So far, the award has been made to seven classes and, being increasingly difficult to obtain, it has resulted in markedly raising the general scholarship of the graduating classes.

Mr. French's interest extended to post-graduate work. In 1902 he suggested the establishment of a post-graduate course and in 1907 the annex laboratory was built on the site of the old Aimwell school property on Cherry Street, for post-graduate and special students. In 1914 he enlisted the interest of Mrs. Mary I. Banks in the College and had her establish the Clayton French Fellowship in memory of her father, a post-graduate fellowship for the prosecution of scientific research along pharmaceutical lines.

On April 4, 1911, at the Union League of Philadelphia, a life-size oil painting of President Howard B. French was presented to the College on behalf of the officers, faculty, members of the Board of Trustees, and members of the College and Alumni Association. The occasion was a felicitous one and was commemorated by a dinner participated in by many of the contributors of the fund and city and State officials. The addresses were warm personal tributes to Howard B. French for his zealous and efficient labor as president of the College and as a leading citizen of his city and State.

His interest in the celebration of the centenary of the College in 1921 was expressed by the formulation of plans long in advance of the celebration. His labor looking to the procurement of a new site for the College and his zeal and industry through a period of years in bringing the College into active relationship with the public life of the city, bear testimony to his love for the institution.

Mr. French's connection with the civic affairs of Philadelphia, and in larger fields, were many and varied. He was a leader and organizer of many movements for the civic betterment of his community and exceedingly earnest in his advocacy of the building of

recreation piers on the Delaware River front of the city, and the extension of the foreign trade of the country through the Commercial Museum of Philadelphia, of which organization he was a trustee. He was chairman of the joint committee of the Commercial Organizations of Philadelphia, and in 1893 and 1894 was chairman of the committee to select a site for the United States Mint in Philadelphia. He served as delegate to the National Board of Trade and was appointed in 1896 as delegate to the convention at Tampa, to devise coast defenses for the Gulf and South Atlantic Harbors. He was a director of the Manufacturers' Club and the Franklin Institute. As an officer and former president of the Philadelphia Chamber of Commerce, a member of the Pennsylvania State Board of Charities, by appointment of Governor Tener, and president of the Equitable Trust Company for a number of years, his life has been one of exceptional activity and usefulness. He served with distinction in 1896 as president of the National Paint, Oil and Varnish Association, and last May was elected a life member of the Philadelphia Paint, Oil and Varnish Club, of which he was one of the founders in 1887.

He took a deep interest in the landed affairs and early history of New Jersey as a member of the Council of Proprietaries which hold the right of proprietorship in unlocated lands. This right has succeeded from one generation to another for two hundred and fifty years.

Mr. French was a member of the following organizations: Committee of Ninety-Five for good city government, Business Men's Republican League, Civil Service Commission of Philadelphia, Business Men's Committees of several Republican presidential campaigns, New Jersey Society of Pennsylvania, Ohio Society of Pennsylvania, Union League, Historical Society of Pennsylvania, Colonial Society, Merion Cricket Club, Philadelphia Skating Club and Humane Society, Pen and Pencil Club, Trades' League, Manufacturers' Club, Southern Home for Destitute Children, Home Missionary Society.

In recent years he maintained an active interest in many of the city's important development problems, such as the Sesqui-Centennial movement, the Delaware River Bridge, the building of the Art Museum, the completion of the Parkway and the construction of boulevards, new transit lines and a greater park system.

Commenting upon Mr. French and his life work the Philadelphia *Ledger* (October 18, 1924), editorially states:

> "Howard B. French was a forward looking and loyal Philadelphian. He was identified with every movement during the last twenty or thirty years for the well-being of the city, the correction of abuses, the stimulation of learning and the advancement of business interests. He possessed a strength of character and a determination in carrying out policies which he deemed to be for the common good that sometimes aroused antagonism. But none doubted the sincerity of his purpose nor the civic patriotism that was the inspiration of his endeavors."

In 1882 Mr. French married Ida Colket, who died last January. He is survived by his daughter Annah, wife of Edgar S. McKaig, Esq., of the Philadelphia Bar. His city house was at 2021 Spruce Street, Philadelphia.

The untiring work of Howard B. French for the public welfare is appreciated and will live through the years to come to stimulate and inspire.

J. W. ENGLAND.

ABSTRACTED AND REPRINTED ARTICLES

STUDY OF PHARMACY HAS TAKEN GREAT STRIDES IN LAST CENTURY.*

By Charles H. LaWall, Ph. M., Phar. D.

Pharmacy is a blend of art, science and business, of professional and commercial transactions, which sets it peculiarly apart from all other vocations.

In it are combined the exact knowledge of the physical sciences, a professional technique that is to be gained only by careful training and much experience, a memory for thousands of important facts and names, and an interest and keen insight into business methods that enables the pharmacist to make a living while he is waiting to serve the needs of suffering humanity in connection with the dispensing of medicines, either directly upon the call of the

*Reprinted from the *New York American.*

patient or on the prescription of the physician, for these are services that the State considers of such importance that the pharmacist must prove his qualifications for the responsibility and in return, therefor, is given certain privileges and rights.

We can form no accurate conception of the scope of such an education in pharmacy without a certain historical perspective as a starting point. Time was when there was no differentiation between the prescriber and dispenser of medicines. Pharmacy as a separate profession has been evolved out of the needs of the changing centuries. In the days when superstition reigned almost supreme in medical practice, when observations were incorrect, case histories based upon faulty premises, and comparisons and analogies erroneous; when a red-colored plant juice was esteemed highly for blood diseases and a yellow drug used in the treatment of jaundice; when the shape of a leaf or a root, rather than the constituents present, determined its therapeutic use, pharmacy was beginning to emerge as a separate craft, and in the period of guilds and professional and trade fraternities had already taken its place as a distinct calling.

For centuries, even until within the shadow of our own time, the training of the embryo pharmacist was based upon the apprenticeship system, which modern practice has discarded in our own country, but which is still retained in some parts of the world. The apprenticeship system presupposed a comprehensive knowledge and wide professional practice on the part of the master or "preceptor," as he was called, and a formal contract bound the apprentice to a service lasting at least three years. The inherent defects of such a system lie in its lack of uniformity and thoroughness and in its variable quality, although under it were trained many leaders in pharmacy, medicine and chemistry during the eighteenth and nineteenth centuries.

Until a little more than one hundred years ago, when the Quaker apothecaries of Philadelphia established a college in which their apprentices should be educated in scientific principles, there was no place where pharmacists might go for an education planned to meet their particular needs. That first college of pharmacy, now known as the Philadelphia College of Pharmacy and Science, was quickly followed by the establishment of one in New York City, now the Department of Pharmacy, Columbia University, then others in Massachusetts, Baltimore and other large centers, until at the pres-

ent time there are more than fifty colleges of pharmacy, the majority of them functioning as departments of State universities, especially in the Western States.

During this period in which the colleges of pharmacy were coming into existence, State laws were being passed requiring certain standards of proficiency and of training or education for the pharmacist, just as has been done in other professions, the object being the protection of the health and safety of the community against unqualified and unsafe dispensers of medicines.

The State laws are by no means uniform, nor does every State require that its registered pharmacists shall be graduates of a recognized college. There are two great organizations in pharmacy which are working toward uniformity and progress in this respect. One is the National Association of Boards of Pharmacy, composed of members of State pharmaceutical examining boards; the other is the American Conference of Pharmaceutical Faculties, consisting of members of the teaching staffs of the majority of the colleges of pharmacy in the United States. Both of these organizations meet coincidentally with the annual meeting of the American Pharmaceutical Association, a national organization of pharmacists devoted primarily to advancing professional knowledge and requirements, and a joint session of these three groups is one of the valuable factors in recent years in promoting advancement of standards and improvement of curricula in the colleges and in raising the requirements for registration in the individual States and bringing them into closer harmony. At present, the requirement for registration in most States is proof of at least four years' practical experience in the calling. This makes it impossible to obtain registration immediately after graduation unless practical experience has been gained before entering college or during attendance upon its courses.

For admission to a pharmacy school at present, the applicant must have successfully completed a four years high school course or furnish evidence of possessing an amount of education equivalent thereto. Applicants not possessing a high school diploma may make up deficiencies in their credits by passing examinations held by the Departments of Education in their respective States. No student is admitted to any pharmacy course leading to a degree with conditions to be made up after entrance.

The list of colleges holding membership in the American Conference of Pharmaceutical Faculties and adhering to the foregoing standards, with the few exceptions noted, is as follows:

Alabama Polytechnic Institute, Department of Pharmacy, Auburn, Ala.

University of California, California College of Pharmacy, San Francisco, Calif.

University of Southern California, College of Pharmacy, Los Angeles, Calif.

University of Colorado, College of Pharmacy, Boulder, Colo.

George Washington University, National College of Pharmacy, Washington, D. C.

University of Illinois, School of Pharmacy, Chicago, Ill.

University of Notre Dame, School of Pharmacy, Notre Dame, Ind.

Purdue University, School of Pharmacy, Lafayette, Ind.

Valparaiso University, School of Pharmacy, Valparaiso, Ind.

Des Moines University, College of Pharmacy, Des Moines, Iowa.

State University of Iowa, College of Pharmacy, Iowa City, Iowa.

University of Kansas, School of Pharmacy, Lawrence, Kans.

Louisville College of Pharmacy, Louisville, Ky.

Loyola University, New Orleans College of Pharmacy, New Orleans, La.

Tulane University of Louisiana, School of Pharmacy, New Orleans, La.

University of Maryland, Department of Pharmacy, Baltimore, Md.

Massachusetts College of Pharmacy, Boston, Mass.

University of Michigan, College of Pharmacy, Ann Arbor, Mich.

Detroit Institute of Technology, College of Pharmacy and Chemistry, Detroit, Mich.

University of Minnesota, College of Pharmacy, Minneapolis, Minn.

University of Mississippi, Department of Pharmacy, Oxford, Miss.

St. Louis College of Pharmacy, St. Louis, Mo.

University of Montana, School of Pharmacy, Missoula, Mont.

University of Nebraska, College of Pharmacy, Lincoln, Neb.

Creighton University, College of Pharmacy, Omaha, Neb.

New Jersey College of Pharmacy, Newark, N. J.

Brooklyn College of Pharmacy, Brooklyn, N. Y.

University of Buffalo, Buffalo College of Pharmacy, Buffalo, N. Y.

Columbia University, College of Pharmacy of the City of New York, N. Y.

Fordham University, College of Pharmacy, New York.

Union University, Albany College of Pharmacy, Albany, N. Y.

The last four institutions will not require high school graduation nor its equivalent, for entrance, until 1925, and will not adopt the three-year minimum course in pharmacy until 1928, according to a recent announcement.

University of North Carolina, School of Pharmacy, Chapel Hill, N. C.

North Dakota Agricultural College, School of Pharmacy, Fargo, N. D.

Western Reserve University, Cleveland School of Pharmacy, Cleveland, O.

Ohio State University, College of Pharmacy, Columbus, O.

The University of Oklahoma, School of Pharmacy, Norman, Okla.

North Pacific College, School of Pharmacy, Portland, Ore.

Oregon Agricultural College, School of Pharmacy, Corvallis, Ore.

University of Pittsburgh, Pittsburgh College of Pharmacy, Pittsburgh, Pa.

Philadelphia College of Pharmacy and Science, Philadelphia, Pa.

University of the Philippines, School of Pharmacy, Manila, P. I.

Medical College of the State of South Carolina, School of Pharmacy, Charleston, S. C.

South Dakota State College of Agriculture and Mechanic Arts, Department of Pharmacy, Brookings, S. D.

Meharry Pharmaceutical College, Nashville, Tenn.

University of Tennessee, School of Pharmacy, Memphis, Tenn.

Baylor University, School of Pharmacy, Dallas, Tex.

Medical College of Virginia, School of Pharmacy, Richmond, Va.

State College of Washington, School of Pharmacy, Pullman, Wash.

University of Washington, College of Pharmacy, Seattle, Wash.

University of West Virginia, Medical School Department of Pharmacy, Morgantown, W. Va.

University of Wisconsin, Course in Pharmacy, Madison, Wis.

The minimum course of instruction in pharmacy for registration in the various States is not less than 1500 hours of instruction covering two college years of thirty weeks each. The degree for this course is that of Graduate in Pharmacy (Ph. G.). For a three-year course, in which the third year is devoted largely to chemical work, the degree of Pharmaceutical Chemist (Ph. C.) is given.

A few of the colleges conduct courses comparable to those in other fields of scientific instruction, which require four years to complete the degree of Bachelor of Science in Pharmacy (B. Sc. Phar.) being awarded on completion of the course. A post-graduate course of two years, following the Bachelor's Course, is available in some institutions for those who desire the Doctorate degree (Phar. D.). At the present time the graduates of the higher degrees find places in the fields of educational and large scale manufacturing work, rather than in retail pharmacy.

The courses leading to the degree of Ph. G. are differently conducted in different sections of the country.

In the colleges which are connected with universities (excepting those in some of the Eastern States) the course is usually planned to occupy a portion of at least five days in each week. In the other colleges, particularly those which are in urban localities, where the existence of many drug stores makes it possible for large numbers of students to combine practical experience with educational work, the courses are so arranged that students are in college but three or four days in the week, and are thus enabled to earn a fair proportion of their tuition and expenses while actually in attendance at college, besides gaining practical experience in many phases of the work, which enables them more quickly to adjust themselves to actual conditions after graduation.

Beginning with 1925, the colleges holding membership in the American Conference of Pharmaceutical Faculties have announced that the minimum course leading to the degree of Graduate in Pharmacy will be three years of college work of not less than 2250 total hours of instruction. This, however, will make no change in the requirements for the course of Bachelor of Science in Pharmacy, for the latter course differs in the fact that it is planned to include fundamental and cultural subjects, such as mathematics, languages, etc., which are an integral part of all baccalaureate work of recognized standing, while the Ph. G. course is a purely vocational course in all but a few institutions.

The courses of instruction in all colleges of pharmacy belonging to the Conference previously mentioned, are standardized by mutual agreement, and the standard adopted is entitled the "Pharmaceutical Syllabus." This was formulated and published by a joint committee representing the three organizations previously referred to, *i. e.*, the American Pharmaceutical Association, The National Association of Boards of Pharmacy and the American Conference of Pharmaceutical Faculties. The main subjects of study required are the following: Pharmacy, Chemistry and Materia Medica. These are further subdivided as follows:

Pharmacy includes:

Pharmaceutical and Chemical Arithmetic.—This is necessary in order that the pharmacist may know how to calculate formulas according to the various systems of weights and measures which he is compelled to learn and use, and to make him a safe dispenser of poisonous substances and an accurate compounder of percentage solutions and of complex pharmaceutical preparations. Chemistry is in reality a mathematical as well as a physical science, and no person who is deficient in mathematical ability can ever hope to comprehend it and pass examinations in it.

Pharmaceutical Latin.—Latin is the language in which the titles of medicines are given in all of the pharmacopœias of the world and the language in which most prescriptions are written. A knowledge of Latin is therefore needed in order to understand the nomenclature of pharmacy and medicine.

Theory of Pharmacy.—This includes lectures and recitations in many important subjects which the pharmacist must

thoroughly understand, such as the pharmacopœias and formularies, relationship of weights and measures, specific gravity, operations requiring the use of heat, such as evaporation, distillation, etc., grinding and pulverizing, solution, filtration, crystallization, percolation and a consideration of the various classes of pharmaceutical preparations, of which there are scores, such as tinctures, infusions, fluid extracts, etc.

Laboratory Practice in Pharmacy and Manufacturing Pharmacy.—This includes actual experience in making of preparations of various degrees of complexity and practice in the technique peculiar to pharmaceutical manipulation.

Dispensing Pharmacy.—This is another laboratory branch in which the student is taught how to compound prescriptions accurately, neatly and quickly.

Commercial Pharmacy.—This gives the student training in the simple forms of bookkeeping and the keeping of the numerous records which the law requires that he must keep. Also instruction in fundamental business principles and definitions pertaining thereto.

Pharmaceutical Jurisprudence.—The modern pharmacist is so surrounded with legal requirements, regulations and restrictions that he must receive specific instructions which will enable him to steer clear of the pitfalls that beset him on every hand in connection with the many laws pertaining directly or indirectly to his calling.

Chemistry includes the following: Elementary Physics. Supplementary to and reviewing previous instruction in this field, with particular application to its importance in pharmacy.

General Chemistry, both Inorganic and Organic.—This is one of the most important fundamental subjects of the course in pharmacy, and has a bearing upon every phase of pharmaceutical work. It consists of lectures and recitations throughout the whole course.

Manufacturing Chemistry.—This is a laboratory branch in which the student is taught to make the simpler chemical compounds in order to illustrate the theoretical principles previously learned.

Qualitative and Quantitative Analysis and Drug Assaying.—These are laboratory branches in which the student learns first to recognize and identify the chemical elements and groups,

and later to separate them and determine their proportions in complex mixtures and to determine the potency of important pharmaceutical preparations when the activity is dependent upon some definite chemical constituent.

Materia Medica includes the following:

Physiology.—This subject is taught in an elementary way in order that the pharmacist may understand the action of drugs upon the human system.

Pharmaceutical Botany.—As the majority of the drugs used by pharmacists are of vegetable origin it is more important that he should know the fundamental principles of botany than of general biology, although this is also taught in some colleges.

General Principles of Materia Medica, including Posology and Toxicology.—In order that the pharmacist may be a safe compounder and dispenser of medicines, he must know the action of drugs, their uses and the antidotes which are applicable for emergency use in cases of poisoning.

Pharmaco- and Therapy-Dynamics.—This consists of instruction in the specific action of drugs upon living organisms and illustrates not only the therapeutic importance of drugs, but also shows how their accurate standardization is accomplished in the case of drugs when chemical methods of assay are of no avail.

Pharmacognosy.—This is a laboratory course in microscopic technique, particularly applied to the study of vegetable drugs, to enable the pharmacist to recognize them either in the whole state or in the finely divided condition in which many drugs are now found.

Bacteriology.—This is another course which involves a knowledge of biology and of microscopy and is on the list of studies in many of the colleges.

The foregoing brief summary of the studies which it is necessary to successfully complete in order to obtain a degree in pharmany seems like a formidable list of subjects, some of which are apparently of little practical importance in the present-day practice of pharmacy. It must be remembered that the pharmacist is licensed by the State, not to simply act as a merchant with special privileges, but because he has assumed the responsibility for certain qualifications regarding the handling, sale, compounding, and dispensing of

medicinal substances, many of them dangerous in the hands of the untrained or careless.

Let us, therefore, take up a new line of thought in connection with the subject and discuss the personal qualities necessary for success as a pharmacist.

The pharmacist must have the same kind of scientific and mathematical ability that is necessary for success in any professional calling. He must above all be accurate, for in his hands the issues of life and death are frequently placed. He must have a good memory to be able to differentiate and distinguish between the thousands of drugs and chemicals which he may be called upon to supply. He must be able to adapt himself to a calling in which the hours are unusually long and in which the confinement to his place of business is a disadvantage. Conditions in this respect, however, have changed materially and are constantly improving.

The pharmacist must be industrious, affable, and must be a good judge of human nature and be possessed of an extraordinary amount of tact and patience. He must have ideals of conduct and procedure that will enable him quickly to appreciate and adopt the great underlying principles that are exemplified in the code of professional ethics that he will be called upon to follow.

Given all of these qualities, the person who takes up the study of pharmacy and pursues it to a successful conclusion will be assured of the following rewards:

1. Membership in a calling which is both ancient and honorable and which, when properly practiced, gains for him the respect of the community which he serves and the esteem of the members of the medical profession with whom he is a co-worker in the interests of public health and safety.

2. Assurance of a quick return on his educational investment, either as a clerk or as a proprietor, for the salaries of registered pharmacists in responsible positions range from $40 to $75 per week, depending upon the locality, the responsibility of the position and the degree of ability of the individual. The pharmacist who owns a store in a locality where the number of drug stores is not out of proportion to the needs of the community is independent of the troubles and worries which beset many other callings.

3. Realization that one is engaged in work which is not only of constructive usefulness to the community when properly performed, but interesting to an unusual degree in the opportunity for

scientific observation and study. Many great scientific discoveries have been made by pharmacists and there are opportunities for still many more.

4. Opportunity to affiliate with technical and professional organizations which enable him to keep his scientific knowledge abreast of the times and to aid in promoting the general progress of the calling.

There are certain pitfalls to be avoided if one is to attain to distinction and honor in the profession of pharmacy. The present trend of commercialism, which has affected the other vocations such as law, medicine, etc., to an equally great extent, is particularly evident in the case of pharmacy, because being a merchant as well as a professional man, his professional qualities are judged by his style of merchandising, and this is obvious even to the casual observer. There is nothing incompatible or unethical in the selling of other than purely pharmaceutical lines, if it is done in a dignified and proper manner, and if the allied lines are not too remote from nor incompatible with a dignified professional practice.

The pharmacist, however, whose sole bid for existence is in the advertising of drugs and medicines at cut rates, or allowing his name to be associated with the advertising of popular nostrums and specialties, which if not actually illegal are certainly not in harmony with the ethics of his calling, is not only doing himself great harm, but is lowering the standard of pharmacy everywhere, and making it more difficult for the worthy members of the profession to gain the recognition they deserve.

Among the pitfalls are those connected with the illegal and clandestine sale of narcotics and of intoxicants. In the case of the first peril it is to the everlasting credit of pharmacy that it has risen to the occasion and accepted its responsibilities to such an unusual extent that one rarely hears of a pharmacist being even indirectly concerned in the sale of "dope."

In the case of intoxicants, the situation is different at the present time. The change is too recent and the temptations too great for pharmacy to have come out unscathed. It is true beyond doubt, however, that most of the bootlegging druggists, both wholesale and retail, were originally in the liquor business, and the transference of their nefarious activities to the field of pharmacy and the temptations thrust upon weak members who were already numbered in the profession have been made possible by the complicated regulations

and incompetent officials of the National Prohibition Enforcement unit.

Two slogans have appeared recently in connection with the profession of pharmacy. One is "Try the drug store first." This must not be accepted, as it often is, as a tacit assumption applicable to all cases. The drug store must be worth trying first and must live up to this self-imposed responsibility if the slogan is to be of value in the future. The other one is "Your druggist is more than a merchant." This, too, is a boomerang when, as is sometimes the case, it is used by individuals who are on the negative side of the scale. Your druggist is more than a merchant only when he fulfills the responsibilities which were accepted by him when his State conferred upon him the distinction of serving the public in the useful capacity of a pharmacist.

It is probably true at the present time that there are too many pharmacies. However, this need not deter any young man or young woman from entering upon the study of pharmacy if there is a sincere desire to follow the profession for its own sake and not as a quick means to a venal end. Good pharmacists are always in demand. A pharmacist who is well qualified is rarely out of a position and the number of failures in business in this calling is unusually low.

Pharmacy has about reached the development of its ultra commercial trend of the past few years. The pendulum has begun to swing in the other direction, as is shown by the lines of goods formerly sold almost exclusively by pharmacists.

The druggist of the future has opportunities which are just beginning to be realized and embraced by far-seeing young graduates of recent years. By his specific training the modern educated pharmacist is well qualified to serve the public, the allied professions of medicine, dentistry and veterinary medicine, and the health officials of his community, particularly in smaller cities and towns, by equipping a small analytical laboratory in connection with his other professional work and functioning as a neighborhood analyst. In this way he can acquire a professional status and reputation and realize upon the scientific factors of his education more fully and expeditiously than in any other manner.

If, however, one is seeking a calling where the educational requirements are easy, the hours short and the work easy and free from responsibility, pharmacy is not the profession that should be selected.

LABELING OF BEVERAGES AND BEVERAGE MATERIALS UNDER THE FEDERAL FOOD AND DRUGS ACT.[1] [2]

By J. W. Sale.[3]

Several court decisions have been handed down recently which are of such importance in their possible application to the beverage industry that all bottlers, officers of beverage supply houses and others connected with the industry should be fully informed regarding them. Moreover, the Bureau of Chemistry is constantly commenting, from the standpoint of the Federal food and drugs act, on the suitability of the labeling of specific beverages and beverage materials, and its is highly desirable that the trade and State food and drug officials be advised in a general way as to progress which is being made in the enforcement of the act, as applied to these products.

One of the court decisions referred to above is that handed down recently by the Supreme Court of the United States in the case of the United States of America, Petitioner, vs. Ninety-five barrels (more or less) alleged apple cider vinegar. Mr. Justice Butler in delivering the opinion of the court made the following statements, among others:

> "The statute is plain and direct. Its comprehensive terms condemn every statement, design, and device which may mislead or deceive. Deception may result from the use of statements not technically false or which may be literally true. The aim of the statute is to prevent that resulting from indirection and ambiguity as well as from statements which are false. It is not difficult to choose statements, designs, and devices which will not deceive. Those which are ambiguous and liable to mislead should be read favorably to the accomplishment of the purpose of the act. The statute applies to food and the ingredients and substances contained therein. It was enacted to enable purchasers to buy food for what it really is."

Even the layman will immediately recognize that the above statement, coming from the Supreme Court of the United States,

[1] Reprinted from *The Spice Mill.*

[2] Based on a paper presented by J. W. Sale at a recent meeting of food officials at Philadelphia, Pa.

[3] Chemist in Charge, Water & Beverage Laboratory, Bureau of Chemistry, U. S.

is of the greatest importance, since it will assist materially in determining whether or not the act is being violated when vague and ambiguous statements which are liable to mislead are made on the labels of beverages, beverage materials and other food.

The lower courts have taken cognizance of the above quoted statement emanating from the Supreme Court as indicated by the court's ruling in the case United States of America vs. McIlvaine Brothers, a corporation. In this ruling Judge Dickinson made the following statements, among others:

> "Fortunately, the Supreme Court of the United States in the Apple Cider Vinegar case (No. 599, October Term, 1923), not yet reported, has charted the course to be followed. The general rule is that the Act of Congress should be so read as to further the accomplishment of its purposes, and that not only any branding which is misleading or liable to mislead but also any which is ambiguous should be visited with the condemnation of the Act. Following the course thus indicated, we encounter the fact finding now made that the branding first given this product has the vice of ambiguity in that although it is not expressly stated that the product is what is known to the trade as powdered colocynth and it is stated that it is powdered colocynth apple, yet it is none the less true that the difference in the product is not so stated as to command attention to the fact that there is a difference but is so stated that the difference may be overlooked and the purchaser be buying one product with the thought in his mind that he is buying another. As we interpret the spirit and true meaning of the ruling cited, it is that a branding which is misleading because of its ambiguity is as much within the inhibition of the statute as if it was misleading in statement."

During the last five years, so many claims of one sort or another have been made which are designed to lead consumers to believe that most beverages contain a high content of fruit, or fruit juice, that one is rather skeptical nowadays with regard to the truthfulness of placards advertising real fruit beverages. It is indeed an unfortunate situation when people are unable to distinguish from the crown caps, bottle labels, soda fountain hangers, bill boards or newspaper advertising, between beverages which contain substantial amounts of fruit, those which are merely fruit flavored, and those which are artificially flavored. It cannot be denied that there is a

marked tendency among supply houses and among bottlers and proprietors of soda fountains to advertise their products in such a way as to make them appear better than they really are; that is, imitation fruit beverages are represented to be genuine; beverages which are merely fruit flavored are represented to be beverages which contain substantial amounts of fruit juice; and beverages which contain substantial amounts of fruit juice are frequently represented to be 100% fruit juice.

The Federal food and drugs act and most State laws are sufficiently broad to prevent a considerable part of such misrepresentation, and it is up to the enforcement officials to apply the laws in such a way as to give the purchaser a square deal. The interstate shipment is the first of a series of negotiations, and if the labeling of the interstate shipment is truthful, then the bottler or the soda fountain proprietor will have no excuse to misbrand the beverages which he manufactures from the flavoring sirup shipped in interstate commerce, and State and city inspectors will have a source of information as to the composition of the finished products. It has been represented to the Bureau of Chemistry on several occasions that if an imitation fruit flavor is labeled by a distinctive name such as "Lot No. 4," no one is deceived or misled because the purchaser knows what he is getting and the goods do not reach the ultimate consumer. However, if imitation flavoring preparations are not required to be labeled as imitations in strict compliance with the law, then the opportunity is lost of informing State inspectors of the character of the flavor, and of preventing the bottler from excusing the misbranding of his beverages on the ground that he thought he was using true fruit flavor.

Classification of Beverages

In considering the legality of beverage labels, we have found it useful to divide beverage flavors and beverages into approximately four main classes, as follows:

Class 1—Fruit juice.
Class 2—Soda fountain sirups and beverages made from them.
Class 3—Bottlers' flavors and bottlers' carbonated beverages.
Class 4—Powdered flavors for general household use.

Class 1—Fruit Juice Beverages.

In Class 1 we have (a) straight fruit juices such as apple juice or cider and grape juice, etc., and (b) fruit juice with added sugar or added acid, including loganberry juice, some grape juices, and the like.

Most of the beverages in Class 1 are being labeled in compliance with the law, and when they are not, the regulatory official will have little difficulty in deciding what constitutes suitable labeling for them. Several years ago complaints were made to the Bureau that grape juice was being adulterated with artificial flavor. The Bureau made a careful examination of the majority of bottled grape juices on the market and did not find any that contained synthetic flavor. Generally speaking, the presence of added sugar should be declared on the label of grape juice and other fruit juices, in strict accord with Item 187, which reads as follows:

"Sugar added to grape juice, loganberry juice or other fruit juice should be declared upon the label. Articles labeled as grape juice, loganberry juice, or as the juice of any fruit, are adulterated if they contain added water." Added acid should also be declared on the labels of bottled fruit juices. The labels of these products may properly bear designs of fruit such as clusters of dripping grapes.

Class 2—Soda Fountain Sirups and Beverages Made From Them.

In Class 2, we have (a) concentrated fruit juice; (b) fruit sirups; and (c) fruit flavored sirups.

(*a*) *Concentrated fruit juice.*—The first subdivision, (a) concentrated fruit juice, is represented by commercial concentrated orange juice filtered and unfiltered. This juice is prepared by evaporating either filtered or unfiltered orange juice in glass-lined vacuum pans under a vacuum of at least 28 inches to a density of 72° Brix measured at a temperature of 38 to 40° C. The article contains no added sugar or other added ingredients, and the directions for use are as follows: Add to one volume of the concentrated juice three-quarters gallon simple sirup, 9¼ gallons ice water, and from 0.005 to 0.01% of emulsified oil of orange. The resulting beverage will contain concentrated orange juice equivalent to 65% of raw juice.

It is, of course, proper to make claims of content of fruit juice in articles of this type and to employ designs of fruit on the label. It is believed that you will have no difficulty in deciding as to what constitutes a proper label for articles of this kind, since there is not involved the question as to whether or not they are imitations.

(*b*) *Fruit Sirups.*—We now come to subdivision (b) fruit sirups, in Class 2, about which there may be some measure of doubt as to suitable labeling. Pending the formulation of definitions and standards for fruit sirups, the Bureau holds that an article designated without modification as a fruit sirup should contain not less than 33 1-3% by weight of fruit juice and not less than 50% by weight of sugar, with no added water or other ingredients. This definition was formulated several years ago and up to the present time has successfully withstood the bombardment of many objections by firms who wished to employ something less than the 33 1-3% by weight of fruit juice in their products, although the definition has never been tested in court.

One of the most important questions that has been raised in connection with this definition has been that of the dilution to which the fruit sirup is to be subjected. Some fruit sirups intended for use at soda fountains are subjected to a dilution of only 1 to 5 or 6 in the manufacture of the finished drink, while others are subjected to a dilution with simple sugar sirup of 1 to 2 or 3 and again to a dilution of 1 to 5 or 6 water, making a total dilution of approximately 1 to 10 or 18. Still other fruit sirups are subjected to even higher dilutions. Does the 33 1/3% standard apply equally to all sirups regardless of their dilution? Our reply to such inquiries is that a decision as to the propriety of the labeling must be based on the complete composition of the product, and upon the character of directions which appear on the label or which are supplied separately to bottlers. If the beverage made from the fruit sirup is to be labeled in such a manner as to indicate that it contains fruit juice, then the fruit sirup should contain not only the required 33 1/3% of fruit juice, but should be employed in such a manner that the beverage manufactured from it according to the directions of the manufacturer will contain a substantial amount of fruit juice. In other words, a sirup which is so reinforced with essential oils that it is necessary to dilute it 10 times or more before it is fit to drink is considered to be misbranded if labeled as a fruit sirup

even though it contains 33 1/3% of fruit juice. This comment applies also to the bottlers' flavors in Class 3.

Item 357, "Labeling of Clear and Cloudy Fruit Flavored Beverages" which applies to genuine and imitation fruit beverages, reads as follows:

> "Terms such as 'ade,' 'squash,' 'punch,' 'crush,' and 'smash' can be applied properly only to beverages, either still or carbonated, which contain the juice or edible portion of a fruit. These terms should not be applied to products flavored only with essential oils or essences, unless plainly labeled as imitations. The Food and Drugs Act requires an imitation to be labeled with the word 'imitation,' together with a statement showing wherein it is an imitation, which ordinarily requires a declaration of those ingredients, such, for example, as essential oil, citric acid, and artificial color, giving the article its principal characteristics.
>
> "It is further held that any turbid or 'cloudy' orange, or other fruit-flavored beverages, which does not contain either an appreciable quantity of the juice or the edible portion of orange or other fruit named, should be labeled plainly as an imitation."

Most fruit sirups contain added acid and color and the presence of these added ingredients should, of course, be declared on the label in a plain and conspicuous manner. There are quite a few products of this class on the market and they are high grade preparations. The labels of these products, in common with the labels of straight fruit juice and of concentrated fruit juice, may properly bear designs of fruit. It is quite important, however, that the labels of these products do not mislead the purchaser into believing that he is getting a concentrated fruit juice. The viscosity of fruit sirups and their general appearance are such that it is comparatively easy to mistake them for concentrated fruit juices. The word "sirup" on products of this type is considered to explain satisfactorily the presence of added sugar.

(*c*) *Fruit Flavored Sirups.* This brings us to a consideration of subdivision (c) fruit flavored sirups in Class 2. To this class belong sirups flavored with essential oils or with fruit juice which is present to a lesser extent than 33 1/3% by weight or with flavor derived wholly and without chemical change from fruit. These products should have the characteristic flavor of the fruit after which they are named and they should be plainly designated as fruit flavored

sirups. From one point of view, when orange extract or orange emulsion is added to a sugar sirup, there is produced an orange sirup. However, owing to the fact that the name "Orange Sirup" may lead some into believing that the article is orange fruit sirup, we much prefer that articles of this sort be designated plainly, as oranged flavored sirups.

It is customary to employ artificial color in fruit flavored sirups for the reason that there is not sufficient of the fruit present in the articles to give them the desired color, and when artificial color is used it should be declared in a plain and conspicuous manner. If it is proposed to add artificial flavor, in addition to artificial color, then in practically all cases there is produced, from the standpoint of the law, not a fruit flavored sirup artificially flavored and colored. but an imitation fruit sirup, which should be labeled with the word "imitation" and the explanatory statement. It is conceivable that so little synthetic flavor may be added to products of this type that the predominating flavor of the article is genuine fruit flavor, but as a matter of fact, owing to the great difference in flavoring power between the natural fruit flavors and synthetic fruit flavors, the amount of synthetics which are ordinarily used is such that the predominant flavor of the resulting product is due to the artificial flavor rather than to the natural flavor.

In such cases, and they constitute a vast majority, the article we have to consider is an artificially flavored and artificially colored sugar sirup with only a negligible amount of true fruit flavor. A product of this type is unquestionably an imitation under the law and should be labeled as such in strict accord with the law, as interpreted by Regulation 20 (a) in Circular 21, which, in order to refresh your minds, I will read to you. Regulation 20 (a): "An imitation shall bear on the label the word 'imitation,' and, in addition, a clear statement of the principal or essential ingredients of the article." The beverages made from fruit flavored sirups are, of course, merely fruit flavored beverages and should be labeled in such a manner that they will not be mistaken for beverages containing substantial amounts of fruit juice. Fruit flavored beverages look and taste so much like fruit juice products that it is easy to palm them off as fruit drinks.

We receive many inquiries as to the propriety of labeling a sugar sirup flavored with cocoa as chocolate sirup. Oftentimes, these sirups contain added vanillin. It has been long the practice to label

articles of this type as chocolate sirups, and pending the adoption of standards for such products, the Bureau has advised correspondents that it is not disposed to object to the labeling of soda fountain sirups made from sugar and water and powdered cocoa as chocolate sirup, provided the article contains not less than 50% by weight of sugar and has a substantial chocolate flavor.

Class 3—Bottlers' Flavors and Bottlers' Carbonated Beverages.

Item 357, to which reference has already been made, applies to products of Class 3 also. While this item refers to beverages specifically, it may be applied in principle to the flavors from which beverages are manufactured. Bottlers' flavors may be divided into the following subdivision, those made (a) from citrus or other essential oils; (b) from extractives such as ginger ale, root beer, etc.; (c) from genuine fruit flavors; (d) from imitation fruit flavors.

(*a*) *Bottlers' Flavors Made from Citrus or Other Essential Oils.*—Bottled sodas flavored with citrus oils such as orange, lemon and lime sodas, may be designated properly by the name of the fruit, provided they are not cloudy, thus simulating the appearance of fruit juice and provided further that no claims of fruit juice content are made for them in collateral advertising, such as soda fountain hangers, bill-boards, newspapers, magazines, etc. Specific authority is not granted by the Federal food and drugs act to develop action based on misleading claims made in collateral advertising. However, if statements are made on the labels of interstate shipments, which are capable of more than one interpretation, it is our custom to accept the meaning conveyed by the manufacturer in his collateral advertising. In this way collateral advertising may sometimes prove quite useful. Designs of fruit should not be placed on the labels of products belonging to this subdivision since at most they contain merely a little fruit flavor and do not contain any fruit juice, as such designs would readily lead one to believe.

(*b*) *Bottlers' Flavors Made from Extractives.*—With regard to subdivision (b) it is believed that little discussion is necessary, for the reason that the Bureau has issued standards for ginger ale and sarsaparilla. The Bureau has advised correspondents that it will take no action against sarsaparilla, because it contains undeclared

caramel color, pending a reconsideration of the standard for sarsaparilla in Circular 136 by the Joint Committee on Definitions and Standards. There may be some question as to the proper labeling of root beer. No standards have been promulgated for root beer or for birch beer. Pending the formulation of such standards, the Bureau has advised correspondents that it will take no action against root beer or birch beer which contains undeclared caramel color, provided the articles otherwise meet the requirements of the Federal food and drugs act.

(*c*) *Bottlers' Flavors Made from Genuine Fruit Flavors.*—The number of beverages belonging to subdivision (c), that is, those whose flavor is true fruit, seems to be gradually increasing. This is a field for careful research. We have had occasion to doubt that some of the flavors alleged to be true fruit are derived wholly and without chemical change from fruit, but this is a rather difficult matter to prove. It is a comparatively simple matter to take, for example, some dried peaches and to extract them with dilute alcohol and to fortify the product obtained with minute amounts of synthetics. When such a product is labeled as a true fruit flavor, it is difficult indeed for the chemist to detect the sophistication; in fact, it is impossible to do so if he has at hand only samples of the finished beverages.

Information which we have obtained in connection with the enforcement of the Federal food and drugs act has convinced us that practically all of the so-called grape flavors for bottlers' use are in fact grape wine to which has been added oil of cognac and methyl anthranilate. Sometimes there is used in place of the oil of cognac a distillate of the skins, leaves and twigs of the grape. Such a product, to our mind, is not grape flavor, but is essentially an imitation grape flavor and should be labeled in strict accord with the law as interpreted by regulation 29 (a). Grape wine flavor is not grape flavor and is not considered to be such by the average person, but, on the contrary, is generally recognized as being an entirely separate article from grape flavor. So far as I am aware, there are no true grape flavors for bottlers' use on the market, although there may be several that are alleged to be of this type. An article which is entitled to be labeled "grape flavor" without modification should be derived wholly and without chemical change from grapes or grape juice.

(*d*) *Bottlers' Flavors Made from Imitation Fruit Flavors.*—A great many bottlers' flavors and bottled sodas belong to subdivision (d) imitation fruit beverages. Bottled sodas which are artificially flavored and colored in imitation of a fruit drink are, without doubt, imitations under the act, and should be labeled with the word "Imitation," which, in our opinion, should directly precede the name of the fruit and should be in type of approximately the same size and prominence as the name of the fruit. Artificial color, when present in beverages in Class 3, should be declared plainly and conspicuously on the label.

Class 4—Powdered Flavors for Household Use.

These products in Class 4 generally consist of a fruit acid such as citric or tartaric, sugar, and a coal tar or vegetable dye. The great majority are imitation fruit preparations and should be labeled as such without equivocation. However, an important exception is powdered lemon juice manufactured by the spray process. It is believed that there will be little difficulty in deciding as to suitable labels for products of this class. Of course, all of these beverages and beverage preparations are food and should bear a suitable declaration of quantity of contents, in accordance with Regulation 26 in Circular 21 and with Item 382.

Other items of interest in connection with the labeling of beverages are the proper use of distinctive names, the use of names such as punch, julep, nectar, etc., the question of caffeine, and of saccharin, etc. A full discussion of all of these points would lengthen this paper unduly. The Bureau is always ready and pleased to answer inquiries regarding the labeling of beverages and other food. The exchange of opinions along this line cannot fail to be of mutual advantage.

SOLID EXTRACTS

"I know a bank where the wild thyme grows."

No one knew until recently that this famous line was only advertising an antiseptic. For it is now known that thymol, the odoriferous substance derived from that herb of romance is twenty-five times as powerful as carbolic acid in germ-killing value.

Nicotine, the volatile alkaloid from tobacco makes a powerful impression on the sense of taste. A nonuser of tobacco can recognize its presence in a solution made by mixing two drops of the pure alkaloid with the contents of the usual street sprinkling water wagon (500 gallons). Strychnine commonly considered the most bitter of the alkaloids is only one-fourth as intense in its taste imparting proclivities.

A mixture containing 20 per cent. of alcohol will freeze at 20 degrees above zero Fahrenheit.

A 25 per cent. mixture will freeze at 7 degrees F.

A 30 per cent. mixture will freeze at 5 degrees below zero; a 35 per cent. mixture at 12 degrees below zero; a 40 per cent. mixture at 20 degrees below; and a 50 per cent. mixture at 35 degrees below.

Glycerin has just about the same protective power as alcohol; that is to say, mixtures of glycerin and water will freeze at just about the same temperatures as those containing the same percentages of alcohol. And glycerin has an advantage over alcohol, in that it does not volatilize so rapidly, and consequently does not have to be replaced so frequently.

Some advocate the use of both glycerin and alcohol with water, but such a mixture would have the disadvantage that its strength in either of its constituents could not be determined by the use of a hydrometer.

Recent investigations have definitely proven that American peppermint oil contains over thirty distinctly different chemical constituents. The plant laboratories are not greatly concerned over Hoover's stunts of simplification and standardization.

It is a long step from coal tar to vanilla, but the chemist has made it at last. Synthetic vanillin, formerly made from oil of cloves (engenol), is now prepared from benzol, a coal tar fraction

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Carbon-dioxide gas, which represents a small part of expired breath, is not the vicious poison that so many believe it to be. As it is a by-product in the human establishment, so also is it a by-product in many industries. For instance, let us mention the fermentation industries, the calcination industries, the coal-distilling industries, etc. In recent years, despite its bad reputation it has become exceedingly popular for many purposes. In 1920 this country used over sixty million pounds of this gas in its ginger ale and other soft drinks.

Nor is the soft drink industry alone in its utilization of carbon-dioxide. For it has developed that this gas can do more than just lend sputter and pep to ginger pop—it is a valuable preservative as well. Butter, ice cream, marshmallow whip and other similar articles of delicatessen are now churned with the gas and their keeping qualities are improved. Also it greatly adds to their bulk and this is allurement to the average customer, who buys by bulk and not by weight. Time was when ice cream was ice cream and marshmallows were marshmallows. Now one might say that they are simply sweetened wind.

Some sensitive chemicals keep best in a carbonated atmosphere, or, if in solution, in bottles which have the free space filled with the gas. Cookies and biscuits and cereals are now sent abroad in carbon-dioxide filled cans.

Ethyl lactate, which is made from grain alcohol (ethyl alcohol) and the acid of sour milk (lactic acid) is a new solvent that has been gradually gaining favor as a possible contender for the place of the much maligned grain alcohol. It is largely used on the Continent for special purposes, Germany, it is said, being its largest consumer.

What makes corned beef red —? The answer is generally saltpetre—and one is expected to be content with that —. The real story, however, is that the saltpetre during the "pickling" process is reduced to the nitrite of potassium, which reacts with the hæmoglobin of the blood and forms nitrosohæmoglobin, which is bright red—hence the color of the corned beef.

Ricin, the chemical principle of castor oil beans, threatens to break all records for poison strength, according to Dr. P. Karrer of the Speyer Hospital research laboratories. Even the latest product is not yet pure and fully concentrated. In its present stage of purity, however, ricin will kill an animal three hundred million times the weight of the dose given. In other words, a grain would kill three full-grown elephants. This relegates such poisons as arsenic and prussic acid into insignificance. Dr. Karrer and associates obtained more than four pounds of this terrific poison from castor bean oilcake, a residue from castor-oil factories.

Mercer, the English textile worker, who discovered the peculiar action of sodium hydrate on cotton goods, and whose name is now common, but not proper, in the word mercerized, missed the most important point of the whole story, and profited very little from his discovery. It was a half century after his time that someone found that it required tension of the cotton fabric, while under the soda treatment, in order to bring out the silky luster.

The General Electric Company at Lynn, Massachusetts, are experimenting with a new glass. It is really not glass but fused, bubble free, quartz. It needs no annealing. Red hot it can be plunged into water without breaking it. It is permeable to all kinds of light rays. Beautifully transparent, a cylinder of it can be bent in the shape of the letter S, and a powerful ray of light impinged at one end of this twisted form will emerge, oddly enough at the other end of the S. It makes light rays bend around corners as it were.

NEWS ITEMS AND PERSONAL NOTES.

JOSEPH CUTTEL ROBERTS DECEASED.—Joseph C. Roberts, for the past fifteen years Superintendent of Laboratories of Sharp & Dohme, Baltimore, died on October 18, 1924, at the home of his daughter, Mrs. Wallace C. Pearson, Downingtown, Pa.

He was the son of Joseph Cuttell Roberts and Mary Kirkwood Roberts, of Guthriesville, Pa., where he was born on September 2, 1865, and lived until the age of ten when his family moved to Wilmington, Del.

He was graduated from the Philadelphia College of Pharmacy in 1885, after which he spent a short time in the drug business in Coatesville, Pa. He then accepted the position as pharmacist in charge at the Philadelphia General Hospital, where he remained for about four years.

Then followed an engagement with Clawson Brothers, in Philadelphia, for a short time, after which he owned and managed a drug store in Wilmington, Del., for five years. He then went with John Wyeth & Brother, of Philadelphia, with whom he remained for about seven years, and in January, 1909, accepted the position with Sharp & Dohme he was filling at the time of his death.

Mr. Roberts was a member of the Masonic Order, the Zeta Phi Alpha Chapter at the Philadelphia College of Pharmacy, the American Pharmaceutical Association, the American Drug Manufacturers' Association, and the Maryland State Pharmaceutical Association.

Mr. Roberts married Miss Eugenia West in 1895, who together with three daughters, Mrs. Wallace C. Pearson, Mrs. George W. Hinder, Miss Sarah Roberts, and one son, Joseph Cuttell Roberts, survive him.

He was buried on October 22d at the East Brandywine Church, Chester County, Pa.

Officials, department superintendents and others of the Sharpe & Dohme organization attended the funeral services at Downingtown, Pa.

The pallbearers were old business associates of Mr. Roberts during his many years of service with Sharp & Dohme.

AN UNIQUE MOCK TRIAL.—The November meeting of the Philadelphia Branch of the American Pharmaceutical Association was held Tuesday evening, November 10th. It was in many respects the most unique and successful occasion in the history of the Branch in this city and reflects a great deal of credit upon the ingenuity and initiative of the present officers of the organization.

The customary dinner, which has become a regular feature of "Branch Night," was served at the Engineers' Club on Spruce Street and was enjoyed by over fifty members and guests, notable among whom were former Judge Patterson, Assistant District Attorney Maurer, Drs. Wood and Coroner's Physician Wadsworth, and Howard Kirk, Esq., who were to play such auspicious parts later in the evening's program.

At eight o'clock sharp, in the auditorium of the Philadelphia College of Pharmacy and Science, began the now famous "mock trial." With an audience that fairly filled the large auditorium, President Harrisson turned over the conduct of the evening's program to the gentlemen of the law who had come there to preside over and participate in the serious business of holding a court of justice, a mock trial indeed, and yet a most impressive, well acted, even if unrehearsed, object lesson to all who came to see and listen. In the judgment seat the Honorable John M. Patterson presided with his wonted grace and dignity. The clerk of the court, Mr. Baldauf, who is clerk in one of the city courts, opened the sessions in the customary formal fashion and District Attorney Maurer introduced as the first case for trial a bill of indictment against one Otto Kraus, a druggist of Sixth and Federal Streets in Philadelphia, charging him with the grave incrimination of "involuntary manslaughter." There was there impaneled to serve as jurors the following duodecimate of "impartial and unwitting persons": Ambrose Hunsberger, bank president; Otto W. Osterlund, financier; Mrs. Josiah C. Peacock, tannin expert; Mrs. M. R. LaWall, horticulturist; Mrs. W. E. Lee, wonardist; Jos. W. England, historian; Ellen Cawley, florist; J. S. Beetem, college registrar; W. L. Cliffe, legislator; Raymond Hendrickson, optimist; B. C. Goodheart, a retired gentleman and W. W. McNeary, hospital superintendent.

Objection was raised by the respective lawyers to certain other jurors whose names were read, mostly on grounds of personal appearance. However, the twelve, tried and true, were finally placed under oath and throughout the trial behaved in a most dignified way,

proud of their authority and determined to look only in the direction of justice.

Here sat the busy court stenographer, Miss Kathryn Myers, and to the one side, whispering ominously, stood the prosecuting attorney, John H. Maurer, eagle-eyed and agile-worded, and his chemical expert, Professor Charles H. LaWall, veteran of many a forensic tussle. Beside them was their sealed evidence—the ghastly viscera of the poisoned man (about whom we shall now soon learn) and the rest of the poison that occasioned the death of the victim.

Opposite were seated the defending lawyer, Howard Kirk, quick and accustomed to complex commissions, and his vade mecum in emergency, the eminent Bucks County chemist, Joseph W. E. Harrisson. There also was the nationally known post mortem artist, Dr. Wadsworth, for years coroner's physician in Philadelphia, who, according to his own testimony, "has examined *some* thousands of human remains." There were also lined up the witnesses who will be referred to later.

But the saddest figure in the entire group reposed in the care of Officer Wilcox, seated in the prisoners' bar. It was Otto Kraus. He, it was charged, had sold to a Mrs. Areolus, the wife of the original owner of the entrails in the chemical expert's possession, a bottle of citrate of magnesia, which contained bichloride of mercury, and which resulted in the death of the unfortunate Mr. Areolus.

Mrs. Areolus, in the person of Mrs. Ada Capwell, figured as the star witness, and recited in terse fashion the sad story of her husband's sore, untimely end. How he had been long a victim of kidney disease and how upon October 4th he had suffered one of his wonted discomforts and sought without medical aid to relieve his pain and distress "with magnesia." How she had sent her star boarder to Mr. Kraus, the druggist, to secure the bottle of the precious panacea, and a half of which she herself had given to her husband, only to have him suffer worse and pass away directly without even a doctor's helping hand. Her testimony seemed clear and she was steadfast through all the cross-examination.

The star boarder, in the person of Ralph Calvert, then underwent the ordeal and suffered certain mental relapses which only added to the prosecutor's case and further frightened the poor defendant.

Next came the coroner's physician, who testified to finding evidence of corrosive poison on the carcass of the one labelled Areolus, No. 929. He also bore well under very cross questioning.

Then came the chemist, who found in the liquid remaining in the bottle the equivalent of several grains of bichloride of mercury and a smaller amount in the stomach of the erstwhile. Cross-fire at him availed the defense but little, except to have him admit that he found in addition to the bichloride certain indefinite evidence of sodium citrate. A ray of hope for the defense!

Constant quarrels by the objecting opposing lawyers added spice to the clever acting.

Then came the exhibit of the defense. The chemical expert testified as to the customary method of manufacturing citrate of magnesia in the drug store and claimed that it would have been unlikely that the defendant could by neglect have placed in the citrate solution a blue bichloride tablet (the only kind he had in his store). The chemist for the prosecution had found sodium citrate in the liquid, which was ample proof that the customary carbonating tablet (in this instance the soda and not the potassium had been used) had been added by the defendant. Certainly he would not have added both the carbonating tablet and a bichloride tablet.

Next came the defendant himself, who admitted the sale—but did not recall it with definiteness—indeed he could not recall much of anything with definiteness. He admitted waiting upon the "star boarder" of Mrs. Areolus mechanically and without any certain recollection of any particular part of the transaction. He insisted, however, that a bottle of citrate of magnesia was always worth more than the quarter usually paid for it.

Cross-examination worked this nonchalance and mechanical performance complex to the utmost, in order to make an impression upon the jury.

Upon this, both sides rested the case and it looked rather badly for the defendant. However, from the audience at this juncture came a pale, visibly nervous person who sought the defending lawyer and whispered a few large words to him and exhibited a much larger book.

The Judge granted permission to reopen the case—for a new witness had turned up in the person of one Ivor Griffith, a small shop apothecary who had read about the case and had come to Mr. Kraus's help as a willing witness. He electrified the court by testifying that he had sold Mrs. Areolus two days previous to the purchase of the citrate from Mr. Kraus, a bottle of bichloride tablets and had made the entry upon his poison register which he exhibited. The prosecut-

ing attorney made light of his testimony, and ridiculed his poison register which was poorly kept and which was not legally authoritative in that the entries were not made by the persons procuring the toxic substance, a specification which the law clearly demanded. In this statement, which was erroneous, he was, however, not contradicted.

The last witness dismissed, the opposing lawyers presented their final pleas to the jury, the prosecutor angrily demanding his Krausian pound of flesh and the defending masculine Portia ably couching his "summing up" in tender, tearful words that completely thawed the sympathetic hearts of the ladies on the jury who, by the time the Honorable Judge had delivered his comprehensive and careful "charge to the jury," were able to convince the men in the panel that a man of Mr. Kraus's noble mien could never have committed, in error or otherwise, a deed as dastardly as this and they accordingly pronounced a verdict of "Not Guilty."

An account such as this can hardly do justice to the educational value of the occasion, but it is worthy to note that the Judge, at the conclusion of the trial, agreed with certain persons conversing with him "that it was the most realistic 'mock' trial that he had ever been privileged to conduct."

There had been no rehearsing or coaching of witnesses—everything had been done spontaneously and extemporaneously and there was not a single hitch in the entire program. To conclude the evening, President Harrisson introduced to the audience, numbering about three hundred, those who had participated in the affair and a general vote of thanks was passed in appreciation of the good offices of the gentlemen of the law who had so ably and willingly helped to make the trial a complete success.

It is suggested that other Branches of the Association follow the example of the Philadelphia section in staging this unique occasion, which portrayed so vividly the actual workings of a court of law and brought to the minds of pharmacists who were there the need for eternal care and vigilance in the conduct of their professional duties.

I. G.

BOOK REVIEWS.

HANDBUCH DER SALVARSANTHERAPIE, MIT EINSCHLUSS DER EXPERIMENTELLEN, BIOLOGISCHEN UND CHEMISCHEN GRUNDLAGEN. By Dr. W. Kolle, of Frankfurt, a/M., and Dr. K. Zieler, of Würzburg, assisted by numerous collaborators. Part 1, 8vo., xiv —750 pages; 20 illustrations. Urban and Schwarzenberg, Berlin and Vienna. Paper bound, 30 gold marks; full bound, 33.60 gold marks.

The enormous extension of medical science is evidenced by this book of many hundred pages, devoted to practically one line of therapeutics. Since the introduction of "606," which produced such a profound sensation, perhaps partly due to its mysterious name, but in great part due to the peculiar principles of therapeutics which it involved, much experience has been accumulated, and notable modifications have been made in the remedy. As might be expected, the forecasts of its value in the treatment of syphilis have not been fully realized, but its later forms have been of great service.

The volume in hand is, as the title indicates, not wholly devoted to the therapeutics of the arseno-benzene derivatives, which find application in certain parasitic diseases other than syphilis, but many biologic and experimental data are presented in detail. The chemistry of the compounds of the "606" class is presented in extended form. References to the literature are abundant. The work is intended to serve the needs of the clinician, especially those who are largely concerned with syphilis, and also to those who are interested in chemotherapy and the more intimate chemistry of the aromatic arsenicals. A highly systematized and well arranged classification enables each user of the book to select promptly the data in which he is especially interested. The numerous collaborators have enabled the editors to secure information upon every phase of the subject and thus produce an up-to-date treatise.

One turns with much interest to the opening chapter on the experimental basis of the salvarsan treatment, contributed by H. Schlossberger, of Frankfurt, a/M. The discovery of salvarsan and its introduction into therapeutics is the classical example of the modern effort at chemotherapy and the treatment of infectious diseases. A summary is given of the history of the methods of treat-

ment of infectious diseases. The data go back to Greek writers, who mention arsenic-bearing minerals as remedies. The development of the treatment of syphilis is connected, of course, with the question of the time and manner of this introduction of that disease into Europe. Many authorities maintain that there is no definite indication of syphilis in Europe until some time after the discovery of America, and believe that the disease was endemic in some parts of the western hemisphere and was brought over by sailors, but this view has been strongly opposed. It does seem, however, that during the century following the opening of the New World to Old World commerce, a striking extension of syphilis occurred in western Europe. It acquired in England the nickname of "French disease" and in France it was popularly known as the "Italian disease." Reasoning from analogy, it seems that this high severity and rapid spread indicate a race that had not been previously infected. The employment of mercurial ointments originated in India and Arabia, and reached Europe about the end of the fifteenth century. One of the most important steps in the early development of chemotherapy was in the application of the quinine alkaloids for the treatment of malaria. Here a true specific seemed to be found. Sydenham first asserted that the action of the remedy was directly upon the morbific material in the blood of the patient. He expressed the wish that a similar material might be found to combat the virus of syphilis.

It is impossible to set forth in the space at hand even a reasonable summary of the information furnished in the monumental volume. To the clinician it offers abundant data of a practical character, while to the chemist interested in the principles of chemotherapy it furnishes a vast amount of theoretic data. The extant literature has been well combed and the clinical and laboratory experiences of the authors and their collaborating staff have been summarized and clearly set forth.

HENRY LEFFMANN.

REVISION OF THE GENUS EUCALYPTUS.

J. H. Maiden, formerly Government Botanist of New South Wales and Director of the Botanic Gardens, Sydney, recently published the sixty-second part of his monograph on Eucalyptus, entitled: "A Critical Revision of the Genus Eucalyptus." In this issue, form-

ing Part 2 of Vol. 7, are discussed nine species, five of which are new. A concise botanical description is given of the trees, the young and mature leaves, the flowers and fruit. In addition, ranges of growth and the affinities of other eucalyptus species are mentioned. Many illustrations of floral and capsular discs, of fruits and other botanical characteristics helpful in the differentiation of eucalyptus species are given on four plates included in this issue.

A general index of parts published is given and reference is made to the forest flora of New South Wales, in which many species of eucalyptus are treated in a popular way with emphasis on the economic value.

It is hoped that Dr. Maiden, who, as we regret to learn, has just retired from his position, will be able to finish his monumental work and especially give us a botanical description of the seeds, which often furnish most valuable characters for species of differentiation.

It is also hoped that all these data be correlated with data of a chemical survey which Dr. A. R. Penfold, Economic Chemist, Technological Museum, of Sydney, has recently undertaken.

Penfold, Bulletin 5 of Technological Museum, Sydney, for instance, found 95 per cent. citral in the essential oil of Backhousin citriodora and 90-96 per cent. of Citronellal in the essential oil of Eucalyptus citriodora. Other experiments of Penfold are recorded on pages 625 to 627 of this journal. With both the botanical and the chemical data of these essential oil plants, so abundant in Australia, at hand, the full utilization of these supplies would seem but a minor problem to be solved in the near future.

The full utilization of these essential oil plants, so abundant in Australia, may, no doubt, be looked for as soon as these extensive surveys are completed. In this connection it may be of interest to refer to recent reports in newspapers, that essential oils of certain eucalyptus species may be used as motor fuel.

ARNO VIEHOEVER.

CHEMISTRY IN INDUSTRY. Volume I. Edited by H. E. Howe, Editor, Industrial and Engineering Chemistry. The Chemical Foundation, Inc., 85 Beaver Street, New York, 373 pp. Price, $1.00.

In response to the demand for such a work, monographs, prepared by twenty-two leading industrial chemists of this country,

have been collected in one volume by H. E. Howe, editor of "Industrial and Engineering Chemistry," and published by the Chemical Foundation, Incorporated, of New York City, under the above title.

The various relations of chemistry to the industrial life of the United States are treated authoritatively by scientific men in non-technical language and in a manner that will grip the general reader. Those who appreciate the importance of the chemical development of this country and those who are interested in the American Chemical Society's Prize Essay Contest will find this book a necessity.

The comprehensive nature of the compilation and the trustworthiness of each article may be judged from the following table of contents and list of contributions:

Chapter 21. Chemistry in the Textile Industry. By L. A. Olney, Professor of Chemistry and Dyeing, Lowell Textile School; President, Stirling Mills and American Association of Textile Chemists and Colorists.

It is rarely, indeed, that the book buyer can get such a dollar's worth as this book represents.

IVOR GRIFFITH.

TOXICOLOGY OR THE SCIENCE OF POISONS. By Frank P. Underhill, Ph. D., Professor of Pharmacology and Toxicology, School of Medicine, Yale University. Printers: P. Blakiston's Son & Co., 1012 Walnut Street, Philadelphia. 292 pp., including index. Price

The author wastes no time in attacking the toxicologist's pet query: "What is a Poison," nor does he waste any time in offering his own reaction to the query—for he gives no answer at all. Instead he furnishes the answers of several other authorities. That is modest and wise—even if it is not brave. However, no one yet has properly answered the question as to what a poison really is, and Dr. Underhill admits "that it is a difficult feat."

The book is divided into the following chapters:

The principles of Toxicology
Inorganic Poisons—Corrosives, Acids and Alkalies
Poisonous Gases
Metallic Poisons
Alkaloidal Poisons
Miscellaneous Organic Poisons

The book is exceedingly comprehensive and the arrangement of the text is well managed. The general plan of the monographs under the individual drugs is exceedingly satisfactory. Thus the subheads under Copper are as follows, and indicate the method of treatment generally adopted throughout the book:

Physical Description and Its Common Compounds.
Acute Poisoning. *Symptoms:* Poisonous Action. Fatal Dose; Fatal Period: Post Mortem Appearances: Treatment.
Chronic Poisoning: *Symptoms.* Bibliogaphy.

The up-to-dateness of the work is well evidenced by the fact that the newer anesthetic gases, ethylene and acetylene, are reviewed,

although lead tetra-ethyl, the "looney gas" of recent notoriety, is not specifically discussed.

In this connection it is amusing, though trite to note, that contrary to the opinions of praise-hungry institutions and ill-informed newspapers, the symptoms of "looney" gas poisoning have been established ever since the Romans called the lead worker a "plumber."

Under alcohol is rendered the sane opinion that "there is no justification for the view that the toxicity of alcoholic spirits is due more to the impurities (ethers) than to the ethyl alcohol.

"The different alcohols generally increase in toxicity with the increase in the size of the molecule." Methyl and ethyl alcohol certainly do not bear out this statement, nor do some of the higher alcohols.

Contrary to a certain recently expressed belief, acetaldehyde or its polymer paraldehyde is stated to have a low toxicity "100 grammes doses known not to have been fatal." That is amusing in view of the statement made in connection with a governmental survey of moonshine liquors, where traces of acetaldehyde were considered as responsible for the toxicity of the liquors in question.

There are omissions which are regrettable, such as di-ethyl-phthalate; phenolphthalein and some of the common poisonous dyes. Also there are many evidences of defective proofreading such as the formula C_6H_5OH for ethanol—the misspelled word alcohol. A peculiar idea is the discussion of potassium chlorate under inorganic acids; and iodine, iodides and iodoform and bromides under poisonous gases. Nowhere do we find mention of the extremely poisonous ricin in the text. This substance is now said to be the most poisonous of all plant products.

However, despite these minor deficiencies, the little volume contains a wealth of accurate information, and it deserves a prominent place in the library of the physician, pharmacist and chemist.

IVOR GRIFFITH.

Ferdinand Hirt & Sohn, Leipzig, publish under the title "Jedermann's Bücherei" (Everybody's Library) a number of little volumes pertaining to Natural Sciences, Literature, Philosophic Technic, History, Medicine, etc. The two following have been submitted for review.

NATURPHILOSOPHIE. Von Prof. Dr. Fr. Lipsius. 136 pp. 60 cents.

This monograph on natural philosophy by an authority on the subject is written in a popular style so as to be readily understood. There is also appended a bibliography and a chronological table containing the principal philosophies from Thales of Milet (about 585) to Albert Einstein (1879—).

METAPHYSIK. Von Hans Driesch. 100 pp. 60 cents.

The term metaphysics is derived from the Greek meta—beyond and physic—physics. It deals with subjects of a non-physical character. The word was first applied to certain philosophical works of Aristotle, because they were written "After his Physics."

The litle book before us is an excellent introduction to Metaphysics.

Verlag von S. Karger, Berlin N. W. 6, sent the two following treatises for review:

DAS MIKROSKOP. Bau, Wirkungsweise, Handhabung und Pflege. Von Ewald Schild, Wien. Octavo. 48 pp. Gold Mk. 1—

This brochure deals with the construction, action, uses and care of the microscope. Thirty excellent illustrations clarify the text. Even a chapter on Literature is added, divided into Theory, General Use, Ultra-microscopy, Microphotography, Histology, Botany, Zoology and Journals.

DIE INSULINBEHANDLUNG BEI DIABETIS MELLITUS. Von Prof. Dr. H. Strauss und Dr. M. Simon, Berlin. 2 Auflage. Octavo. 62 pp. Gold-Mk. 2.40.

The first edition of this treatise in October, 1923, was soon followed in March, 1924, by a second, enlarged edition. This shows how this American treatment finds also favor in the "Fatherland." This excellent treatise also contains a complete bibliography up to the end of February, 1924. Pharmacists should also become posted on the Insulin Treatment to keep abreast of the times.

OTTO RAUBENHEIMER, Ph. M.

The Verlorgsbuchhandlung Theodor Steinkopff, Dresden-Blasewitz, publisher of pharmaceutical, chemical, technical and other scientific works, not forgetting the old "Pharmazeutische Zentralhalle," submitted the following six books for review:

GRUNDLAGEN DER AALYTISCHEN CHEMIE. Von W. Ostwald, 7. Auflage. 238 pp. $1.20.

Known throughout the universe is the name Wilhelm Ostwald. The book was first published in 1894 and is now in its seventh edition. That thus far fifteen thousand copies have been printed is a true proof of its usefulness and popularity. The work is divided into two parts:

I. Theory. In five chapters the different laws and other various theoretical matter are thoroughly explained.

II. Practise. The practical application occupies seven chapters and comprises H and OH Ions, Alkalies, Earth Alkalies, Iron Group, Copper Group, Tin Group and Non-metals.

Ostwald's Scientific Principle of Analytical Chemistry in Theory and Practice is a masterwork!

DER RADIO—AMATEUR. Von Dr. P. Lertes, Assistant am Physikalischen Institut der Universität, Frankfurt a. M. 3 Auflage. Octavo. 216 pp. $1.40.

On May 12, 1897, Marconi proved his epoch-making discovery of wireless telegraphy by sending a message from Lavernock Point on the Bristol Canal to the Rocky Island Flatholm, a distance of five kilometers. What strides, what great strides have been made along this line during the past quarter of a century:

The book is divided into the five following parts:

I. Physical and Electro-technical.
II. Radio—Telegraphy.
III. Radio—Telephony.
IV. Radio—Amateur.
V. Historical Resumé.

The 114 illustrations and the two tables are very valuable and greatly help to elucidate the text.

DIE ATOME. Von Jean Perrin. Uebersetzt von Dr. A. Lottermoser. 3. Auflage. Mit 16 Abbildungen. Octavo. 213 pp. $1.00.

Science is international! This work written in French by Jean Perrin, Professor of Physical Chemistry of the Faculty of Sciences in Paris, has an authorized German translation by Dr. Lottermoser, Professor at the Saxon Technical High School in Dresden. The first edition was published in 1912 and the third is just off the press. Among the eight chapters I want to call special attention to the following: Atomic Theory and Chemistry; Molecular Movement; Brownian Movement and Laws; The Atom of Electricity.

KOLLOIDCHEMIE UND BIOLOGIE. Von H. Freundlich. Mit. 4 Abbildungen. Octavo. 47 pp. 50 cents.

This little book is the outgrowth of the author's "Capillary Chemistry and Physiology." Being written by an authority on this subject, who is a member of the Kaiser Wilhelm Institute for Physical Chemistry in Berlin—Dahlem, its statements can be thoroughly depended upon. The appendix contains sixty references to literature, a very valuable addition.

CHEMISCHE REAKTIONEN IN GALLERTON. Von Dr. Raphael Ed. Liesegang, Frankfurt a. M. 2. Auflage. Mit 39 Abbildungen. Octavo. 90 pp. 85 cents.

The rapid strides made in colloidal chemistry made this book a necessity. The chemical reactions in jellies in thoroughly explained and newer theories are included. An Index of Literature, an Author's Index and a Subject Index conclude this excellent work which we can highly recommend to all interested.

UEBER NATURPRODUKTE. Chemische Abhandlungen zur Kenntnis und Verwertung verschiedener Naturprodukte. Festschrift Zum 70. Geburtsstaye von Max Hoenig von Fachyenossen, Freunden und Schülern gwidmet. Herausgegeben von Prof. Dr. B. M. Margosches und Priv.-Doz. Dr. W. Fuchs, Deutsche Technische Hochschule Brünn. Octavo. 181 pp. $1.30.

Prof. Dr. Max Hönig has been connected with the German Technical High School in Brünn ever since 1875, in the capacity of

dozent, assistant and professor. At the celebration of his seventieth birthday his colleagues, friends and students dedicated this "Festschrift" to their beloved master. It contains contributions not only from authorities in Austria, Bohemia and Germany, but also from England, Sweden and Norway. The monographs deal principally with nature's products, their properties and uses. The Festschrift also contains a bibliography of Hönig's publications, not including his many patents, and also his photograph on the title page.

OTTO RAUBENHEIMER, Ph. M.

INDEX TO VOLUME 96 OF THE AMERICAN JOURNAL OF PHARMACY.

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